World Health Organization
Regional Office for South-East Asia

Strategic plan for Measles Elimination and Rubella and Congenital Rubella Syndrome Control in the South-East Asia Region

2014–2020

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Acronyms

AD	Auto-disable
AEFI	Adverse events following immunization
CBAW	Child Bearing Aged Women
CRS	Congenital rubella syndrome
EPI	Expanded Program on Immunization
GFIMS	Global Framework for Immunization Monitoring System
GIVS	Global Immunization Vision and Strategy
GVAP	Global Vaccine Action Plan
IgM	Immunoglobulin M
IMCI	Integrated management of childhood illness
ITAG	SEAR Immunization Technical Advisory Group
JRF	Joint reporting form
MCV1	First dose of measles-containing vaccine
MCV2	Second dose of measles-containing vaccine
MDG	Millennium Development Goal
MMR	Measles, mumps and rubella vaccine
MR	Measlesrubella / measles and rubella
NML	National measles-rubella laboratory
NRAs	National regulatory authorities
NVC	National Verification Committee (For measles elimination)
RC	Regional Committee
RCV	Rubella-containing vaccine
RED	Reaching every district
RRLs	Regional reference laboratories
RT-PCR	Reverse transcription polymerase chain reaction
RVC	Regional Verification Commission (for measles elimination)
SEAR	South-East Asia Region
SIAs	Supplementary immunization activities
VPD	Vaccine preventable diseases
UNICEF	United Nations Children Fund
WHO	World Health Organization

Foreword

In 2012, the World Health Assembly (WHA) endorsed the Global Vaccine Action Plan (GVAP) and its objective to eliminate measles in 4 WHO Regions by 2015. Since then, Member States of all 6 WHO Regions, including the South-East Asia Region have adopted measles elimination goals.

The Strategic Plan for Measles Elimination and Rubella and CRS Control in the South East Asia Region provides a framework for the 11 Member States towards strengthening surveillance systems to meet the measles elimination and rubella/CRS control goal by 2020 (Resolution SEA/RC66/R5, Sept 2013). This Strategic Plan is based on years of experience in implementing immunization programmes and incorporates lessons learned from polio eradication activities. The strategy stresses the importance of strong routine immunization systems supplemented by campaigns, laboratory-based surveillance, outbreak preparedness and case management, as well as linkage and partnerships and building public trust.

To achieve measles elimination, the strategies outlined in this document will need to be implemented. Policy and practice gaps leading to missed opportunities for measles vaccination need to be addressed. To continue on the trajectory of progress towards achieving the 2015 MDGs, global measles control targets and regional measles elimination goals, the 11 Member States in this Region and partners need to increase the visibility of measles elimination activities and make the investments needed to strengthen health systems and achieve equitable access to immunization services.

Measles elimination and rubella/congenital rubella syndrome control is one of our flagship programs in this Region and will be supported and monitored by WHO. With strong partnerships, resources and political will, we can, and will work together to achieve and maintain the elimination of measles, and control of rubella and CRS in the South East Asia Region by 2020. Let us use this Strategic Plan to expand equitable access to measles and rubella vaccines to reach the unreached population to save many more precious lives that are our are the future of the globe. I believe that this goal, endorsed by the Sixty-sixth Session of the WHO Regional Committee for South-East Asia in September 2013 will protect and improve the lives of children and their mothers throughout the South-East Asia Region, rapidly and sustainably through well-known and tested interventions.

Dr Poonam Khetrapal Singh
Regional Director

Executive Summary

This strategic plan for measles elimination and rubella and congenital rubella syndrome (CRS) control in the South-East Asia Region (SEAR), from 2014 to 2020, fulfils the Regional Committee (RC) request to the Regional Director "to mobilize financial resources and build on the existing partnership in support of measles elimination and rubella/CRS control" (Resolution SEA/RC66/R5). The dramatic improvements in immunization coverage, case-based measles and rubella surveillance, and regional measles and rubella laboratory network over the past decade have prepared the Region to move forward towards the declared goal of measles elimination and rubella/CRS control by 2020. Most countries in the Region have begun the activities needed to eliminate measles and many are also addressing CRS. All 11 countries in the Region already have measles elimination goals with established target dates, as do the six World Health Organization (WHO) Regions.

The measles elimination and rubella/CRS control goal may be reached if four strategic objectives are achieved: (1) achieve and maintain at least 95% population immunity with two doses against measles and rubella within each district of each country in the Region through routine and/or supplementary immunization; (2) develop and sustain a sensitive and timely integrated measles and rubella case-based surveillance system and CRS surveillance in each country in the Region that fulfils recommended surveillance performance indicators; (3) develop and maintain an accredited measles and rubella laboratory network that supports every country or area in the Region; and (4) strengthen support and linkages to achieve the above three strategic objectives.

Numerous strategies in line with existing global guidelines are suggested to achieve these four objectives. Guiding principles of country ownership, strengthening routine immunization and health systems; equity and critical linkages with other health sectors; line ministries and civil society are emphasized as being the largest contributors of measles elimination and rubella/CRS control activities to child health and for achieving the fourth Millennium Development Goal (MDG) 4.

Total costs to achieve regional measles elimination and rubella/CRS control are estimated to be US$ 803.1 million, of which US$ 572.8 million (71%) is for supplementary immunization activities (SIAs); US$ 199.5 million (25%) is for measles-rubella (MR) surveillance, including laboratory support; and US$ 26.0 million (3%) is for outbreak response immunization. Costs for the other budget components are estimated to be US$ 4.8 million (1%). These estimates do not include direct support to strengthen routine immunization services.

1 Background

Measles remains a significant cause of morbidity and mortality worldwide. Of the estimated 122 000 global measles deaths in 2012, 43% occurred in the South-East Asia Region and India alone accounted for 14%.1 The importance of measles prevention and control to the achievement of MDG 4 is reflected in the key indicator of measles immunization coverage as a measure of progress towards this MDG.

Although rubella is a mild disease, rubella infection during early pregnancy can severely affect the fetus, resulting in spontaneous abortion, stillbirth or an infant born with a combination of birth defects known as CRS. In 2010, an estimated number of 103 000 infants with CRS were born globally, of which 46% were in the South-East Asia Region.[2]

In September 2013, the WHO Regional Committee for South-East Asia at its Sixty-sixth session noted the progress made in the Region towards measles mortality reduction and rubella control. Having considered the feasibility and associated challenges of eliminating measles and rubella/CRS, the Committee decided to adopt the goal of measles elimination and rubella/CRS control in the South-East Asia Region by 2020 (Resolution SEA/RC66/R5). With numerous initiatives in immunization and primary health care still in progress, including the intensification of routine immunization, the Region is well-positioned to achieve this goal.

With this Resolution, the six WHO Regions have measles elimination goals with established target dates endorsed by their respective Regional Committees. Among the other Regions, the Region of the Americas has already eliminated both measles and rubella. The Western Pacific Region has set a target for measles elimination by 2012, and 32 out of 37 Member States are in the process of verifying the achievement of this target. The target year for the European Region and the Eastern Mediterranean Region is 2015, and for the African Region, it is 2020. The European Region also has a rubella elimination target and the Western Pacific Region has an accelerated rubella control and CRS prevention goal by 2015.

Measles elimination activities present unique opportunities to accelerate control of or eliminate rubella and CRS. Because rubella is less infectious than measles, if countries use combined MR vaccines, then when measles is eliminated rubella and CRS will also be eliminated. The strategies for both are similar and can be integrated. Rubella vaccine is highly effective (95% with one dose), safe (whether given independently or in combination) and affordable. The effectiveness of integrated measles and rubella/CRS elimination strategies has been amply demonstrated in other regions. Several countries of the South-East Asia Region have already

1 World Health Organization. Global Control and Regional Elimination of Measles, 2000–2012. WER 2014; 6:45-52.
2 Vynnycky E., Adam E. Report on the Global Burden of Rubella and Congenital Rubella Syndrome, 1996–2010. (Unpublished data).

introduced the combined measles/rubella vaccine in their national immunization schedule with more likely to follow due to an increasing trend towards combination vaccines that is driven by market forces.

Countries in the South-East Asia Region have used different strategies to introduce the rubella-containing vaccine (RCV) including: (1) routine childhood immunization, either one or two doses; (2) selective vaccination among young adolescent and susceptible adult females; (3) incorporating RCV into measles SIAs; and (4) different combinations of the above-mentioned strategies. The recent GAVI (Global Alliance for Vaccination and Immunization) commitments to fund rubella vaccine introduction through national, wide age-range SIAs and a one-time routine introduction grant should lead to increase the use of RCV and thereby a dramatic reduction of rubella virus circulation and children born blind, deaf, mentally retarded, with heart defects and other manifestations of CRS.

2 Current status of measles, rubella and CRS

The South-East Asia Region has made dramatic improvements in immunization coverage, case-based measles and rubella surveillance, and establishing a regional laboratory network between 2000 and 2013.

Immunization coverage with first dose of measles-containing vaccine (MCV1) increased from 65% in 2000 to 78% in 2013. As per WHO/UNICEF estimates in 2013 (JRF), MCV1 coverage was over 90% in six countries, among which three had more than 80% coverage while two had more than 70%. Nine countries offer a second dose of measles-containing vaccine (MCV2) through routine immunization. By August 2014, all countries except Thailand have conducted national or subnational wide age-range measles SIAs targeting measles susceptible populations with Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka conducting campaigns with combination measles and rubella vaccines. Between 2010 and 2013, India conducted a measles supplementary immunization campaign targeting 139 million children aged 6 months to 10 years (about half that age cohort) in 14 states followed by the introduction of a second dose of MCV2 through routing immunization services and introduced the second dose of MCV2through routine immunization without a preceding campaign in the remaining 21 states (Annex 2). Seven countries offer rubella vaccine through routine immunization in combination with measles and/or mumps vaccine. Four small states in India also offer rubella vaccine through routine immunization.

Surveillance capabilities and performance have improved considerably over the last decade. Currently, all countries except India conduct case-based surveillance for measles and rubella among health facilities, and all countries conduct case-based surveillance for measles and rubella cases occurring in the setting of outbreaks. While the magnitude of the burden of rubella/CRS is not fully known, measles surveillance has "unmasked" a substantial burden of rubella in the Region. Among the 10 countries conducting case-based surveillance in facilities, the discarded measles rate was 3.3 per 100 000 population in 2011 based on feedback in a regional meeting in February 2012 (target $\geq$ 2/100 000), with five countries exceeding the target 2/100 000 population (Annex 3). However, only 34% of suspected cases had serologic specimens collected and tested, and only four of nine countries met the specimen collection rate of 80%.

CRS surveillance is routinely conducted in two countries in the Region, Bangladesh and Sri Lanka. In 2014, Nepal established CRS surveillance in five sentinel sites, while Indonesia conducted pilot CRS surveillance and plans to expand its CRS surveillance by the end of 2015. Special studies have been conducted in other countries; between 2000 and 2002, Myanmar conducted active surveillance that documented the presence of CRS during an inter-epidemic period. In India, a review of all studies related to CRS was published in 2012.[3] In Maldives, a retrospective review of CRS was conducted in 2003.[4]

3 Dewan P, Gupta P. Burden of Congenital Rubella Syndrome (CRS) in India: a systematic review. Indian Pediatr. 2012 May; 49(5):377–99.

4 Retrospective rubella review, Maldives. Wkly Epidemiol Rec. 2005 Mar 11; 80(10):88–92.

The South-East Asia Region laboratory network has a total of 37 laboratories with at least one national measles-rubella laboratory (NML) in each of the 11 countries, and with capacity for virus isolation and genetic sequencing. Three regional reference laboratories (RRLs) include, one in Bangkok, Thailand, for serology and molecular sequencing; one in Chennai, India, for serology; and one in Pune, India, for sequencing and genotyping. Most countries have one NML, except for India, which has 11 and Indonesia, which has four. Among these 37 laboratories, 20 are accredited by WHO and three new laboratories in India (Guwahati, Patna and Bhopal) are pending accreditation. Additionally, Thailand has established a subnational measles laboratory network of 14 laboratories that are guided by the RRL in Bangkok.

In 2013, the network tested 15 235 specimens for measles and/or rubella, with 89% of results available within seven days of receipt by the lab (target ≥ 80%). Given a target discarded measles rate of 2 per 100 000 population, the laboratory network will need to evaluate at least 37 500 specimens per year in the absence of measles virus transmission. The network is capable of handling this quantity of specimens and more.

The Region's outbreak preparedness and response capacity has been demonstrated in part by the more than 500 suspected measles or rubella outbreaks reported and investigated in 8 of the 11 Member States during 2013 (Bhutan, Democratic People's Republic of Korea, Maldives and Timor-Leste did not report any outbreaks). Among 248 confirmed measles outbreaks, 10 108 cases were identified throughout the Region. However, very few specimens were collected for virus detection (target ≥ 80% of outbreaks with specimens collected for virus detection). Some countries, such as Timor-Leste, have been able to mount effective measles outbreak response immunization activities.

WHO has provided extensive human resource support for polio eradication to five Member States (Bangladesh, India, Indonesia, Myanmar and Nepal) for over a decade. In 2011, over 1400 people were either contracted or given additional financial support to provide technical and operational support to maintain polio-free status and address other immunization initiatives in the Region. This support is considered to have been critical to achieving polio-free status and likely will be needed to achieve measles elimination and rubella/CRS control.

The impact of the operational progress over the past decade has been a 57% reduction in the estimated number of measles deaths from 2000 to 2012 among all countries in the Region except India. India experienced a 71% reduction over the same time period.[5] This is expected to significantly increase once the impact of India's recent measles campaign is factored in. Between 2000 and 2013, the number of measles cases (excluding India) reported in the WHO-UNICEF Joint Reporting Form (JRF) decreased by 79% and the measles incidence rate declined by 82% from 163 to 29 per million population. The actual incidence is significantly greater due to underreporting, but the actual decrease in cases may be greater, as measles and rubella surveillance and case detection has improved considerably since 2000.

Current and recently circulating measles genotypes appear to be primarily D5 in Myanmar and Thailand; D8 in Bangladesh, India and Nepal; and D9 in Indonesia and Myanmar. In addition, D4 (commonly associated with Europe) has been identified in India and Nepal; D7 in India; G2

5 WHO. Global control and regional elimination of measles, 2000–2012, WER No. 6, 2014, 89, 45–52.

in Indonesia and Thailand; and G3 in Indonesia. It is important to note that specimens for virus detection are collected rarely during measles and rubella outbreaks and the actual genotype distribution is therefore unknown.

As for rubella, the number of reported rubella cases was 6670 in 2012 and 9405 in 2013. Most cases were reported from Bangladesh (3034), India (2568), Indonesia (2456), Nepal (755) and Thailand (539) in 2013. Rubella genotypes include 2B in Bangladesh, India, Nepal and Sri Lanka and 1E in Sri Lanka.

3 Strategic goal, objectives and strategies

Goal

Elimination of measles and rubella and CRS control by 2020.

Objectives to achieve the goal

1. Achieve and maintain at least 95% population immunity with two doses against measles and rubella within each district of each country in the Region through routine and/or supplementary immunization.
2. Develop and sustain a sensitive and timely case-based measles and rubella and CRS surveillance system in each country in the Region that fulfils recommended surveillance performance indicators.
3. Develop and maintain an accredited measles and rubella laboratory network that supports every country or area in the Region.
4. Strengthen support and linkages to achieve the above three strategic objectives.

Strategies to achieve the objectives

Strategic and tactical approaches to achieve measles elimination and rubella and CRS control incorporate principles contained in several global guidance documents including the Global Strategic Plan for Measles and Rubella Elimination, 2012–2020,[1] Global Immunization Vision and Strategy (GIVS),[2] Global Framework for Immunization Monitoring and Surveillance (GFIMS),[3] WHO position papers on measles and rubella vaccines,[4,5] WHO guidelines on monitoring progress towards measles elimination,[6] the Global Vaccine Action Plan(GVAP) and others. Strategies are listed below their respective target objectives.

Objective 1: Achieve and maintain at least 95% population immunity against measles and rubella within each district of each country in the Region through routine and/or supplementary immunization

1 Use a combination of approaches

Depending on the country-specific context, a combination of approaches will be used to effectively reach all children with all vaccines provided by the national immunization programme by their first birthday and beyond, and other populations as determined by their susceptibility profile measured through immunization coverage, surveillance information and studies as appropriate.

- The emphasis will be on using the routine immunization system to deliver the vaccine, this being a routine activity or campaign.
- Other opportunities for vaccination may include The World Immunization Week and country-specific child health days.
- Additional approaches for targeting older ages may include vaccinating at schools, universities, military installations, health-care facilities and factories.
- Other innovative approaches should be developed based on local circumstances.

Strategies to achieve rubella and CRS control may differ by country depending on the history of RCV use by the national immunization programme and the age groups currently protected, in addition to other factors specific to the country. However, general strategic immunization approaches likely would be based on the population immunity status as described by the categories listed below.

1. For countries with long-term rubella vaccination programmes or that have conducted national wide age-range SIAs such that female birth cohorts through 40 years of age or older and male birth cohorts up to 22 years of age are protected against rubella as of 2014:
    - Continue to maintain high vaccination coverage through the routine childhood programme
    - Assess susceptibility in child bearing age women (CBAW) to ensure immunity
    - Monitor for outbreaks among adult males
2. For countries that have protected both female and male birth cohorts up to at least 15 years and under 20 years of age as of 2014:
    - Continue to maintain high vaccination coverage through the routine childhood programme
    - Assess susceptibility in CBAW to ensure immunity
3. For countries that have not yet introduced RCV or have introduced RCV recently such that protected birth cohorts have not yet reached child bearing age:
    - SIAs may be used to target appropriate age groups of both male and female birth cohorts to achieve the rubella and CRS control goal
    - Introduce RCV into the routine childhood programme with MCV1
    - For countries and areas with susceptible CBAW:
        - Vaccinate CBAW of any age with RCV at convenient times (e.g. premarital vaccination, post-partum or when bringing newborn children for vaccination)
4. For all countries and areas:
    - Ensure immunity in health workers to prevent nosocomial transmission of rubella

Using the reaching every district "RED" approach is a way of not only successfully delivering the vaccine but also strengthening the immunization service delivery system.

A school entry requirement for a completed immunization series, especially for measles and rubella, is very effective in preventing transmission of vaccine preventable diseases when children enter communal educational settings. Such requirements also benefit the educational system by reducing absenteeism from school and benefit the economy by reducing parental absenteeism from work as they care for their sick children.

2 Optimize two-dose schedules of measles and rubella-containing vaccines

Recommendations for optimal routine MCV1 and MCV2 schedules are included in the WHO measles position paper (2009). MCV1 should be administered at age 9 months in countries with ongoing transmission in which the risk of measles mortality among infants remains high. MCV1 may be administered at age 12 months in countries with low rates of measles transmission (i.e. those near elimination) in which infants have a low risk of infection. MCV2 should be administered during the second year of life, ideally at age 15–18 months, particularly in countries and areas providing MCV1 at 9 months, to reduce the percentage of susceptible children at an early age.

Rubella vaccination should be integrated with measles vaccination and this will require the use of either MR or measles, mumps and rubella vaccine (MMR). Currently, WHO recommends that one dose of RCV should be administered (MCV1) either at 9 months or 12 months of age.6 The age depends on the schedule of measles immunization in a country. Giving rubella vaccine only with the second MCV dose results in lower coverage and leaves children unprotected. SAGE (Strategic Advisory Group of Experts) on Immunization also recommends that countries use the same vaccine (either MR or MMR) for both MCV doses. This simplifies vaccine procurement, logistics and recording and decreases vaccine wastage. These recommendations should be taken into consideration in the development of Member States' national plans of action for measles elimination and rubella/CRS control.

3 Strengthen vaccine management systems

Accurate demand forecasting for vaccines, injection equipment and supplies and cold chain at district, provincial and national levels is critical for providing uninterrupted immunization services and avoiding preventable spoilage and wastage. Appropriate temperature maintenance of heat-sensitive and cold-sensitive vaccines, and keeping light-sensitive vaccines away from sunlight should be assured.

4 Increase community demand

Advocacy and programme communication are critical to the success of the elimination initiative. Advocacy to decision-makers, social mobilization of relevant sectors and interest groups, and culturally appropriate communication strategies and activities should be planned and conducted regularly and at every level to ensure optimal utilization of immunization services. Regular reliable

6 World Health Organization. Meeting of the Strategic Advisory Group of Experts on Immunization, November 2013—Conclusions and Recommendations, WER, 2014; 1(89):1–20.

delivery of safe immunization services is also important to build trust among parents and the greater community.

5 Improve vaccine, immunization and injection safety

Safe immunization requires safe and potent vaccines, safe injection practices and proper waste disposal. Vaccines should be procured from manufacturers that meet internationally recognized standards. National regulatory authorities (NRAs) should perform their necessary functions. Surveillance and response to adverse events following immunization (AEFI) should be able to identify and correct programme errors and ensure programme credibility to the public, and should be a key component of every national plan of action. Auto-disable (AD) syringes and safe disposal of used needles and syringes should be ensured.

6 Monitor and evaluate

Programme monitoring and evaluation at every level will identify problems in a timely manner so that adjustments and/or feedback may be provided to staff and local partners on performance, obstacles and opportunities for improvement. Local level monitoring may include routine reviews of EPI registration books and community-based rapid coverage assessments to ensure high-quality immunization programme performance.

Operations' research can help validate proposed strategic or tactical changes in programme implementation before universal application. Periodic independently-conducted coverage surveys may validate administrative coverage and assess programme quality.

Appropriate basic training and regular in-service training for vaccinators and other involved health workers including communication skills (new technology, risk communication, etc.).

Objective 2: Develop and sustain a sensitive and timely case-based measles and rubella surveillance system and CRS surveillance in each country in the Region that fulfils recommended surveillance performance indicators

1 Conduct case-based surveillance for measles and rubella

The regional consultation, which was held in Delhi in September 2013, forged a consensus on the surveillance standards, agreement on the targets and core indicators and the reporting requirements. The standards and reporting requirements are available as Annexes 2 and 3.

All countries will report case-based surveillance data of measles and rubella to the South-East Asia Regional Office by December 2015 and make the required adjustments to their surveillance systems, including case investigation forms, if needed, to ensure sensitive, timely, and complete case-based reporting and investigation of measles and rubella to the national levels facilitating the fulfilment of this requirement. Every country will be supported by at least one NML and will be served by an RRL.

Expansion of reporting sites to local level facilities and private sector providers is needed to identify additional if any suspected measles cases. Case investigations should include a thorough search for an investigation of additional cases among contacts (both before and after each case) and other potentially exposed people. Details will be available in the regional surveillance guidelines under development.

2 Establish and/or expand CRS surveillance

CRS surveillance is necessary to document the impact of rubella vaccination and to identify children with disabilities, early, to provide an opportunity for medical care. Sentinel surveillance may be adequate to provide a baseline and demonstrate programmatic impact. As countries progress toward control and countries gain experience in identifying infants with CRS, the number and location of reporting sites may be extended to other appropriate facilities (e.g. secondary care hospitals and tertiary care centres such as eye, ENT) to increase the sensitivity of the surveillance system. Another approach to identifying infants with CRS is through the identification and active follow-up of pregnant women that are suspected rubella cases or contacts of suspected rubella cases. A national or local registry of pregnant women with confirmed or suspected rubella should be established to record pregnancy outcomes and the clinical and laboratory assessment of the infants. Countries may need to ensure appropriate follow-up measures for children identified as having CRS. The CRS surveillance should be enhanced during outbreaks of rubella regardless of the level of national rubella control.

Countries without existing CRS surveillance systems should consider the following steps to establish CRS surveillance (Guidelines for establishing/ strengthening CRS surveillance (Annex 13)).

1. Identify national CRS surveillance coordinator(s) responsible for epidemiological and laboratory components of the system.
2. Determine the health-care facilities at which infants with CRS are likely to be seen and enroll these facilities as sentinel surveillance sites; identify a CRS surveillance coordinator at each facility or group of facilities.
3. Conduct initial and refresher training for participating providers.
4. Initiate CRS surveillance activities.
5. Establish a reporting mechanism.
6. Conduct quality assessment and monitoring of CRS surveillance.
7. Expand CRS surveillance and include other sites, as appropriate.
8. Analyse CRS surveillance data on a quarterly basis, or more frequently if necessary.
9. Provide periodic feedback to all stakeholders involved in the CRS surveillance system.
10. Ensure infection control measures for CRS cases.

3 Provide training in case identification and investigation, and data management and analysis for responsible officials

Training of health officials at all levels provides opportunities for advocacy and to integrate other health initiatives.

4 Provide adequate operational resources to ensure case investigation with collection and transport of specimens for case confirmation and virus detection

Travel and required allowances should be provided for case investigations, additional case finding and outbreak response. Specimen collection equipment, shipping containers and shipping costs also should be provided. This can be integrated with the current VPD surveillance system.

5 Assure quality of surveillance data by routine monitoring and supervision

Local, district, state/province and national units should monitor data received by lower-level units/staff and review findings with relevant staff. Identification and correction of logical inconsistencies and/or missing data in case investigation forms, summaries and computerized data bases, in a timely manner, will ensure appropriate interpretation of data for decision-making at every level. Regular supervision may ensure adherence to standard operating procedures.

Provide regular feedback of surveillance data and performance to all levels of the system. Feedback may consist of text messages, phone calls, memos, periodic newsletters or bulletins and/or periodic review meetings in which data quality, performance indicators and results of epidemiologic analysis are reviewed and discussed. Regular communication should also be established between surveillance units, programme units and laboratory staff to reconcile data or classification discrepancies and ensure up to date and uniform knowledge and agreement of measles incidence and epidemiology. A CRS case registry should be established at a central place.

Objective 3: Develop and maintain an accredited measles and rubella laboratory network that supports every country or area in the Region

1 Annual accreditation of NMLs and RRLs.

Accreditation of NMLs will be conducted annually and accreditation status is given according to WHO criteria based on laboratory performance during the preceding 12 months. Accreditation of RRLs uses similar criteria. Specifically, the criteria for NML accreditation include:

1. Results are reported by the laboratory on at least 80% of samples for measles and rubella Immunoglobulin M (IgM) tests within seven days of receipt.
2. Serological tests are performed on at least 50 specimens annually.
3. The accuracy of measles and rubella IgM detection is at least 90% (as determined from parallel testing on a sample [usually 10%] of positive, equivocal and negative specimens at the RRL).
4. Internal quality control procedures for IgM assays are implemented.
5. The score on the most recent WHO proficiency test is at least 90%.
6. Results from virus detection and genotyping (if performed) are completed within two months of receipt of specimen and data are reported to WHO monthly, for 80% or more, of the samples appropriate for genetic analysis.

7. The score from the annual on-site review of laboratory operating procedures and practices is at least 80% (may be conducted less frequently for consistently good-performing laboratories).

2 Case-based laboratory reporting from NML to the National Programme and to the South-East Asia Regional Office on a monthly basis.

NMLs should submit a case-based line list report for measles and rubella laboratory data at least on a monthly basis and regularly share virus isolation and genotyping/sequencing data of measles viruses. Timeliness and completeness of reporting laboratory data to the South-East Asia Regional Office will be monitored.

3 WHO and the national authorities will provide adequate operational support for supplies, equipment and specimen transport costs.

Operational support includes providing funds and procurement assistance to priority countries in the Region for consumables (including testing kits), operational and shipping costs, and laboratory equipment related to both serologic and molecular laboratory needs.

4 WHO will provide technical support to RRLs and NMLs to obtain baseline genetic information on measles and rubella viruses using stored samples as well as genetic information from both outbreaks and sporadic cases in order to verify the absence of endemic measles virus transmission.

Technical support will include but not be limited to meetings, workshops and hands-on training. Regular updates of laboratory methods and techniques related to measles and rubella case confirmation and virus detection will be provided to network laboratory members.

Objective 4: Strengthen support and linkages to achieve the above three strategic objectives

1 Advocacy, social mobilization and communication

1. Advocacy, social mobilization and communication foster community ownership and demand for immunization that is necessary to increase coverage, identify, report and respond to suspected measles, rubella and CRS cases and ultimately to achieve measles, rubella and CRS goals.
2. Budgeted national plans for advocacy, social mobilization and communication should be prepared to address the needs for measles elimination and control of rubella/CRS.
3. National and subnational coordination and advisory bodies for measles elimination and rubella/CRS control should be formed (that includes government, nongovernment, bilateral and international partners). Members of existing interagency coordinating committees and advisory bodies would be logical members of measles elimination and rubella/CRS control coordination and advisory bodies. Terms of reference should be explicitly described; meeting minutes with action points specifying responsible people and timelines should be prepared and distributed after every meeting.

4. Representatives from ministries of education, defence and labour as well as from individual schools and universities, military installations and factories are all logical partners interested in measles elimination and rubella control and can help organize special immunization initiatives for their staff and identify and report suspected measles and rubella cases.

5. A regional verification commission (RVC) and national verification committees (NVC) for measles (and rubella/CRS) elimination should be well-formed ahead of achieving elimination. These can be effective advocacy and communication instruments to government and professional societies.

6. Communication strategies may incorporate traditional media channels, lessons from commercial and public marketing campaigns and social media. Strategies should address the nature and threat of measles, rubella and CRS, the safety, efficacy and contraindications of the vaccines and strategies to manage AEFI.

2 Outbreak preparedness and response

WHO has developed guidelines for measles outbreak investigation and response in mortality reduction settings that are also applicable to elimination settings.[7] Once a country reaches the elimination or near-elimination stage, however, an outbreak is defined by evidence of any measles transmission within an area, i.e. two temporally and geographically linked confirmed cases. The approach to outbreak response immunization (ORI) varies depending on the level of susceptibility in the population, the risk for spread and complications and the existing health-service infrastructure and resource availability. Small localized self-limited outbreaks may occur following importations. Detailed analysis of available measles/rubella surveillance data, timely and thorough case and outbreak investigations with contact tracing, and laboratory confirmation of suspected cases are needed to accurately characterize outbreaks. An accurate understanding of population immunity and surveillance quality through rapid district and/or provincial risk assessments by age group would provide valuable information in determining the need, timing and extent to be covered of ORI.

A budgeted outbreak preparedness plan for locally funded outbreak response and provision of vaccine stocks should be established at national and subnational levels for emergency use. Risk or vulnerability assessments that assess population immunity, surveillance performance and migration patterns should be conducted periodically. Ideally, supplementary immunization interventions should occur based on such periodic vulnerability assessments before outbreaks occur.

Measles and rubella outbreak response efforts should also seek to reduce morbidity and mortality by providing appropriate case management. Administration of Vitamin A to people with measles decreases the severity of the disease and the risk of death or xerophthalmia, and its possible progression to blindness. All suspected measles cases should receive two doses of Vitamin A (three doses if the child presents with ocular complications), following guidelines for the integrated management of childhood illness (IMCI) and supportive care at the first referral level, including additional fluids (such as oral rehydration solution), antipyretics and, when appropriate (for secondary bacterial infections), antibiotics and referral to the next level of care.[8]

During and following rubella outbreaks, active CRS surveillance should be implemented with special attention to investigation and active follow-up of pregnant women with suspected rash illness in the affected area. Additional measures could include investigation and vaccination of susceptible contacts to reduce the risk of exposure to pregnant women.

3 Measles immunization in an emergency[7]

An emergency is a situation in a subnational area, a country, a region or a society where there is considerable or even total breakdown of infrastructure, civil society or other authority. Emergencies can be caused by natural disasters, human events or a combination of both. Common natural disasters that cause emergencies include floods, typhoons/cyclones, forest fires, earthquakes, tsunamis and even volcanic eruptions. Some of these can be anticipated and prepared for; there are areas that are affected by floods every year, while other areas are hit by typhoons/cyclones every year. Other natural disasters such as earthquakes, tsunamis and volcanic eruptions are unpredictable and more difficult to prepare for. Emergencies caused by human events – war, revolution, famine – are much less predictable.

All these events frequently result in displaced people living in overcrowded conditions with poor sanitation and shelter and with food and safe water in short supply. In the short term, four types of communicable diseases cause 50% to 95% of deaths: diarrhoeal disease, acute respiratory infections (ARIs), measles and malaria. The very young, the very old, pregnant women, the malnourished and people with other chronic diseases are disproportionately affected.

The primary reason for high measles morbidity and mortality in emergencies is the failure to immunize against measles before the crisis. In a crisis, the local immunization programme may be disrupted, resulting in even more of the youngest children vulnerable to measles. In such an environment, measles can spread rapidly and result in high morbidity and mortality. The first core commitment for children in emergencies is to vaccinate all children 6 months through 14 years against measles. If any case, it is imperative that all children 6 months through 4 years be immunized. Vitamin A supplementation must be provided also.

The Region suffers multiple natural disasters every year and Member States have disaster emergency response plans. Measles vaccination is a key part of the health response in many situations. Activities before an emergency should include comprehensive planning, adequate funding, identification of adequate and accessible resources and supplies and staff training. As countries eliminate measles, it is possible that the target age range for measles vaccination in an emergency response will decrease, but until all countries have eliminated measles, all children 6 months through 4 years in affected populations should be immunized against measles.

4 Research and development

Research helps define effective strategies and tactical interventions to achieve the measles elimination and rubella/CRS control goal. Potential research topics might include certain steps.

1. Evaluate the causes of and risk factors (by age group) for measles outbreaks in post-SIA and high coverage settings, especially among adults.

2. Determine the transmission patterns and role of minorities, marginalized groups and migrants in sustaining measles transmission.
3. Evaluate the impact of different measles outbreak response triggers and strategies to interrupt measles virus transmission. Potential factors that could trigger a response include number of cases, generations/duration of transmission, geographic extent of outbreak, MCV coverage/population immunity in surrounding areas. Response strategies include timing, geographic scope and targeted ages of response.
4. Evaluate the soundness and feasibility of currently proposed and alternative criteria for verification of measles elimination in large and small countries, and assess which of these are relevant to verification of rubella control and elimination.
5. Compare acute fever and rash with clinical measles and rubella case definitions for positive and negative predictive value and acceptability by health workers and laboratory staff.
6. Evaluate the operational feasibility of using aerosolized measles vaccine during SIAs or routine immunization sessions.
7. Determine the CRS burden of disease in priority countries.
8. Evaluate the usefulness and feasibility of potential indicators to monitor CRS surveillance sensitivity (e.g. congenital cataract rates).
9. Susceptibility of children born to mothers who did not have natural infection but previously had only MCV1; the age their immunity starts waning.

5 Improve management of human resources at all levels; specially at middle level

Monitoring of human resource capacity and availability is an important component of overall programme monitoring, particularly if frequent staff turnover exists. Extensive collaboration with other programme units is important to effectively plan capacity-building and efficiently utilize available staff at all levels.

6 Identify and utilize synergistic linkages of integrated programme efforts

Maternal and child health programmes, nutritional support programmes, pandemic, avian and seasonal influenza initiatives, malaria prevention and others all have mutual interests in effective delivery systems, surveillance and data management. With limited financial resources, collaboration with other programmes is likely to be necessary to achieve complementary programme objectives and promote programme synergies.

7 Programme monitoring and oversight

The Regional Immunization Technical Advisory Group (ITAG) will serve as the oversight body for measles elimination and rubella/CRS control. The ITAG will meet annually and ad hoc to review progress and provide advice on issues and the way forward.

In addition to the agreed targets and indicators, the following operational milestones will be monitored.

1. By the end of 2014:
    a. Regional surveillance guidelines and national action plans will be in place.
    b. All countries will have initiated case-based reporting of measles/ rubella and CRS.
    c. All countries will plan to have adequate access to an accredited national and reference laboratory.
2. By the end of 2015:
    a. Case-based surveillance for measles and rubella will have been established in all countries.
    b. All countries will have initiated sentinel surveillance for CRS.
    c. Susceptibility profile of populations to measles and rubella in all countries will have been determined.
    d. RVC and NVC established in all countries.
    e. All countries will have adequate access to an accredited national and reference laboratory.
3. By the end of 2016:
    a. All countries in the Region will have an optimized two-dose measles immunization schedule that includes rubella vaccine.
    b. All countries with large susceptible populations to measles or rubella will have conducted high-quality wide-age range immunization campaigns against both measles and rubella.
4. By the end of 2018:
    a. All countries will have undergone a comprehensive surveillance and immunization reviews.
5. By the end of 2019:
    a. All countries will have updated their national plan of action.
    b. The NVC in each country will produce a comprehensive report on the status of measles elimination and rubella and CRS control.
    c. The RVC will report on the status of all countries and the prospects for meeting the 2020 goals.
6. By the end of 2020:
    a. All NVCs will fully assess their country for measles elimination and rubella and CRS control.
    b. New regional plan of action for measles and rubella and CRS for ensuring sustainability of the achievements.

4 National implementation of strategic plan

Budgeted national measles elimination and rubella/CRS control plans of action should be developed or updated based on this regional strategic plan and global guidelines. Plans should be prepared jointly with other concerned health sectors, line ministries, civil society stakeholders and partners. Action plans may be used to guide incorporation of measles and rubella specific activities and resource needs in other planning documents such as:

1. comprehensive multi-year plans for EPI;
2. detailed EPI implementation/operational plans (with budgets) that include health and other sectors; and
3. annual immunization (EPI) operational/work plans.

Annual EPI operational/work plans are necessary at the national and subnational level to translate strategic plans into action, strengthen collaborative mechanisms with other programmes and partners, and effectively mobilize resources from government and national and international partners. National immunization programmes and ministry of health officials need to play a leading role in advocating for the human, material and financial resources required to achieve measles elimination and rubella/CRS control.

5 Regional Office activities

WHO's South-East Asia Regional Office, in collaboration with UNICEF and technical partners, will continue to provide technical assistance to countries in support of their efforts to eliminate measles by 2020 and control rubella/CRS transmission, and maintain elimination thereafter. Specific assistance will be provided as needed to support routine and SIAs and epidemiologic and laboratory surveillance through on-site visits, electronic communication and periodic training workshops, reviews or technical consultation meetings. The South-East Asia Regional Office will coordinate regional epidemiologic and laboratory surveillance data management to monitor regional and country-specific progress towards achieving and sustaining measles elimination and rubella/CRS control and provide feedback to Member States and partners as appropriate through electronic publications and direct correspondence. WHO's South-East Asia Regional Office, in collaboration with UNICEF, will conduct advocacy and resource mobilization efforts at the regional level while country offices and national counterparts do so at the national level. WHO's South-East Asia Regional Office will also convene the ITAG and establish and convene meetings of the Regional Commission for verification of measles elimination.

6 Verification of measles (and rubella) elimination

Verification criteria and processes will be needed to eventually verify achievement of the goal at both regional and national levels. RVCs and NVCs should be established early on at regional level and in all countries to identify and recognize countries that achieve elimination before 2020 and provide guidance and encouragement for those that have not yet achieved elimination. As some countries may very likely eliminate rubella in the process of eliminating measles, RVCs and NVCs should be empowered to verify rubella elimination as well.

The Regional Director will appoint RVC members and a Chair, while respective ministers of health will appoint NVC members and chairs. Members of national certification committees for polio eradication could be recruited to serve on NVCs. Terms of reference should be explicitly described. WHO's South-East Asia Regional and country offices will serve as secretariats to the RVC and NVCs, respectively.

7 Estimated budget and financing

It is assumed that countries will conduct large-scale SIAs and ORIs as needed, and implement ongoing case-based surveillance for measles, rubella and CRS. Assumptions are also made about the need for technical support, advocacy and communication strategies in the Region.

Projected costs

Estimated costs for proposed SIAs, ORIs, measles and rubella surveillance including laboratory support, CRS surveillance, communication, research, technical support, and verification are provided in Annexes 7 to Annex 12. In summary, total estimated costs for SIAs, ORIs and measles and rubella surveillance, by country, during 2013 through 2020 are given in Table 1. These costs do not include current costs for the India SIAs that are being completed in 2013, and assume that India and Indonesia will conduct future SIAs and ORIs with MR.

Table 1 Estimated costs for SIAs, ORI and MR surveillance, by country, SEAR, 2013–2020 (In US dollars)

Country	SIA	ORI	MR Surveillance	Total
Bangladesh	102 814 211	4 141 806	14 323 926	**121 279 943**
Bhutan	0	25 620	552 858	**578 479**
DPR Korea*	0	636 223	836 528	**1 472 751**
India	290 899 737	9 005 080	149 261 957	**449 166 774**
Indonesia	121 342 575	7 397 251	10 130 164	**138 869 990**
Maldives	0	9 588	179 308	**188 897**
Myanmar	15 664 547	1 390 490	7 447 232	**24 502 269**
Nepal	9 522 430	1 294 807	11 435 892	**22 253 129**
Sri Lanka	0	615 509	444 160	**1 059 669**
Thailand	31 287 679	1 413 239	4 622 367	**37 323 285**
Timor-Leste	1 247 148	84 917	276 386	**1 608 451**
Total	**572 778 327**	**26 014 530**	**199 510 780**	**798 303 636**

*Democratic People's Republic of Korea

Total estimated costs to eliminate measles and control rubella/CRS for the Region by cost category and year are summarized below in Table 2. As above, these costs also assume that India and Indonesia will use MR vaccine in future SIAs and ORIs, and do not include the current costs for phase 3 of India's SIA that is being completed in five states in 2013.

Total costs are estimated to be US$ 803.1 million, of which US$ 572.8 million (71%) is for SIAs, US$ 199.5 million (25%) is for MR surveillance, including laboratory support, and US$ 26.0 million (3%) is for ORIs. Costs for the other budget components are estimated to be US$ 4.8 million (1%). These estimates do not include direct support to strengthen routine immunization services.

Table 2 Summary of Estimated Costs to Eliminate Measles and Rubella and CRS Control, SEAR 2013–2020 (In US dollars)

2012–2015	2013	2014	2015	Total
SIA	62 708 959	121 463 489	196 918 757	**381 091 204**
ORI	0	0	0	**0**
MR Surveillance	1 4 191 491	14 275 401	21 208 767	**49 675 659**
CRS Surveillance	160 000	192 000	230 400	**582 400**
Communication	50 000	50 000	50 000	**150 000**
Research	50 000	50 000	50 000	**150 000**
Tech Support	50 000	50 000	150 000	**250 000**
Verification	0	200 000	100 000	**300 000**
Total	**77 210 450**	**136 280 890**	**218 707 924**	**432 199 263**

2016–2020	2016	2017	2018	2019	2020	Total
SIA	41 408 263	305 091	68 056 778	51 736 846	30 180 143	**191 687 122**
ORI	2 585 761	3 721 898	3 803 613	6 064 527	9 838 730	**26 014 530**
MR Surveillance	20 159 351	27 129 298	34 018 336	34 339 400	34 188 736	**149 835 121**
CRS Surveillance	276 480	331 776	398 131	477 757	573 309	**2 057 454**
Communication	50 000	50 000	50 000	50 000	50 000	**250 000**
Research	50 000	50 000	50 000	50 000	50 000	**250 000**
Tech Support	50 000	0	100 000	100 000	100 000	**350 000**
Verification	50 000	50 000	50 000	100 000	200 000	**450 000**
Total	**64 629 856**	**31 638 064**	**106 526 858**	**92 918 530**	**75 180 919**	**370 894 227**

Summary	2013–2015	2016–2020	2013–2020
SIA	381 091 204	191 687 122	572 778 327
ORI	0	26 014 530	26 014 530
MR Surveillance	49 675 659	149 835 121	199 510 780
CRS Surveillance	582 400	2 057 454	2 639 854
Communication	150 000	250 000	400 000
Research	150 000	250 000	400 000
Tech Support	250 000	350 000	600 000
Verification	300 000	450 000	750 000
Total	**432 199 263**	**370 894 227**	**803 093 490**

8 Contributions to child health and health systems strengthening

An investment in measles elimination provides multiple benefits to child survival in addition to decreased morbidity and mortality from measles. The Joint WHO/UNICEF South-East Asia/ Western Pacific Regional Child Survival Strategy identifies measles immunization coverage as one of the core indicators to track progress in child survival, and IMCI protocols seek to utilize opportunities to provide MCV and other vaccines to children presenting to health facilities. Measles elimination contributes to achieving MDG 4: "Reduce by 2/3, between 1990 and 2015, the under-five mortality rate." One of the three indicators for monitoring progress towards achieving MDG 4 is the "proportion of one year-old children immunized against measles."

Benefits provided by measles elimination are many. First, control of measles infection prevents the increased susceptibility to and mortality from pneumonia and diarrhoea that lasts for months following infection. At a global level, diarrhoea and pneumonia cause 36% of deaths among children under five years old. Second, the need to achieve 95% coverage with two doses of MCV requires programme managers at every level to refocus efforts on strengthening routine immunization service coverage and quality, using strategies recommended in the (GIVS). Third, measles and rubella SIAs can and should be used to strengthen routine immunization services by identifying and developing strategies for reaching high-risk areas and populations, strengthening vaccine and cold-chain management, providing additional training on important immunization and health system components, including routine immunization monitoring together with SIA coverage monitoring and other areas. Fourth, administering MCV2 at 15–24 months of age creates a platform for other interventions such as DTP4, OPV4, Vitamin A, deworming medicine, and growth monitoring. Fifth, provision of nutritional supplements such as Vitamin A with routine MCV1 and during SIAs provides additional protection of children against disease. Sixth, establishing school-entry requirements provides an opportunity to ensure fully immunized status of children with all antigens, decreases child absenteeism from school and parental absenteeism from work and strengthens collaboration between health and education ministries establishing relationships that will help promote school health overall. Finally, use of standardized monitoring indicators and requirements to report, analyze, interpret and feedback data builds capacity to strengthen monitoring and surveillance systems and data management over all, thereby, strengthening health systems.

Annex 1 Key definitions

For the purpose of case-based surveillance for measles and rubella in the South-East Asia Region, a measles suspect case definition will be used as the starting point. However, the testing algorithm will include testing first for measles, then all measles-negative samples will be automatically tested for rubella.

1. **Starting case-based reporting from January 2014 with weekly reporting from subnational level to national level, and from national levels to the WHO Regional Office**

2. **A suspected measles case:**

   A suspected measles case is any person in whom a health worker suspects measles, or any person with fever and maculopapular rash (non-vesicular) with cough, coryza or conjunctivitis.

3. **A suspected measles outbreak:**

   A suspected measles outbreak is the occurrence of five or more suspected measles cases over a period of one month in a population size of at least 100 000. [However, countries that are already advanced in their measles elimination activities, lower than five suspected cases, may be used].

4. **A confirmed measles outbreak:**

   A confirmed measles outbreak is the occurrence of three or more laboratory confirmed measles cases over a period of one month in a population size of at least 100 000, and even in a situation where less than three laboratory cases are confirmed, if epidemiologically linked, it would still be considered an outbreak.

   [In a large outbreak, in order to manage the pressure on laboratories, 10 cases will be tested by serology. If an outbreak has less than 10 cases, all should be tested].

5. **An adequately investigated measles outbreak:**

   An outbreak is considered adequately investigated when the following activities are completed:

   - initial visit to the cases within 48 hours of report;
   - house-to-house search for cases within one week of report;
   - information collected on all core epidemiological data variable;
   - samples for serology from 10 suspect cases, or all suspected cases if fewer than10 cases, collected;
   - urine and nasopharyngeal samples are collected for viral isolation and characterization from at least five suspected cases.

6. Case classification

(a) Laboratory confirmed:

A case that meets the clinical case definition and is laboratory confirmed.

(b) Epidemiologically confirmed:

A case that meets the clinical case definition and is linked to a laboratory-confirmed case.

(c) Clinically confirmed:

A case that meets the clinical case definition and for which no adequate blood specimen was taken.

(d) Discarded non-measles non-rubella:

A suspected case that has been investigated and discarded as non-measles and non-rubella case using:

i. laboratory testing in a proficient laboratory; or

ii. epidemiological linkage to a laboratory-confirmed outbreak of another communicable disease that is neither measles nor rubella.

Annex 2 Basic minimum indicators

Indicator	Target	Definition
1. Disease Incidence (i) Annual incidence of confirmed measles cases (per one million population) (ii) Annual incidence of confirmed rubella cases (per one million population) (iii) Report annually	Absence of indigenous measles transmission	The ***numerator*** is the confirmed number of measles or rubella cases for the year and the ***denominator*** is the population in which the cases occurred multiplied by 1 000 000. When numerator is zero, the target incidence would be zero.
2. Adequacy of investigation (i) Proportion of all suspected measles and rubella cases that have had an adequate investigation initiated within 48 hours of notification (ii) Report as often as routine reports – weekly	≥ 80%	The ***numerator*** is the number of suspected cases of measles or rubella for which an adequate investigation was initiated within 48 hours of notification and the ***denominator*** is the total number of suspected measles and rubella cases, multiplied by 100.
3. Outbreak investigation (i) Percentage of suspected measles outbreaks fully investigated (ii) Percentage of suspected outbreaks tested for virus detection (iii) Report as often as routine reports – weekly	≥ 80% ≥ 80%	(i) The ***numerato***r is the number of confirmed outbreaks that meet the fully investigated outbreak criteria and the denominator is the total number of suspected outbreaks multiplied by 100 (ii) The numerator is the number of confirmed outbreaks tested for virus detection and the ***denominator*** is the total number of suspected outbreaks multiplied by 100
4. Immunization coverage (i) MCV1 & MCV2 coverage nationally and by subnational administrative units (ii) Report annually	95% nationally, 90% subnationally	The ***numerator*** is the number of infants who received MCV1 & MCV2 and the ***denominator*** is the surviving birth cohort multiplied by 100

Indicator	Target	Definition
5. Timeliness of reporting (i) Proportion of surveillance units reporting to the national level on time (ii) Proportion of countries reporting to their WHO Regional level on time (iii) Report as often as routine reports – weekly	≥ 80% 100%	(i) The ***numerator*** is the number of surveillance units reporting on time and the ***denominator*** is the total number of surveillance units in the country multiplied by 100 *[Remember each reporting unit will report 52 times a year]* (ii) The ***numerator*** is the number of countries reporting on time to the Regional Office and the ***denominator*** is the total number of countries multiplied by 100
6. Reporting rate of discarded non-measles non-rubella cases (i) A national reported discarded rate of non-measles, non-rubella per 100 000 population (ii) Report monthly	≥ 2%	The ***numerator*** is the number of non-measles non-rubella discarded cases and the ***denominator*** is the total population of the country multiplied by 100 000
7. Representativeness of reporting (i) Proportion of subnational administrative units reporting at least two discarded non-measles, non-rubella cases per 100 000 population (ii) Report monthly	≥ 80%	The numerator is the number of subnational units reporting at least two discarded non-measles non-rubella cases per 100 000 and the denominator is the total number of subnational units multiplied by 100
8. Laboratory confirmation (i) Proportion of suspected cases with adequate specimens for detecting acute measles or rubella infection collected and tested in a proficient laboratory (ii) Report as often as routine reports – weekly	≥ 80%	The ***numerator*** is the number of suspected cases from whom adequate specimens for detecting measles or rubella were collected and tested and the ***denominator*** is the total number of suspected measles or rubella cases multiplied by 100 [Epi linked cases should be removed from the denominator]

Indicator	Target	Definition
9. Timeliness of specimen transport (i) Proportion of specimens received at the laboratory within five days of collection (ii) Report monthly	≥ 80%	The ***numerator*** is the total number of specimens received in the laboratory within five days of collection and the ***denominator*** is the total number of specimens received by the laboratory multiplied by 100
10. Timeliness of reporting laboratory results (i) Proportion of results reported by the laboratory within four days of receiving the specimen (ii) Report monthly	≥ 80%	The ***numerator*** is the total number of specimens for which laboratory results were available within four days of receiving the specimen and the ***denominator*** is the total number of specimen received for testing multiplied by 100

Annex 3 Minimum core variables for reporting to the South-East Asia Regional Office

- Case EPID ID/Outbreak Identifier ID
- Country, state, district, sub-district, block
- Sex
- Date of birth/age
- Date of onset of fever
- Date of onset of rash
- Cough, coryza or conjunctivitis [Yes/No]
- Date of notification
- Date of investigation
- Vaccination:
  - Number of MCV doses, date of last dose
  - Number of RCV doses, date of last dose
- Travel history
- Serology:
  - Specimen ID for serology
  - Date and type of specimen collected
  - Date of serology specimen sent to lab
  - Date of serology specimen received at lab
  - Adequate specimen sample
- Virology:
  - Specimen ID for virology
  - Date and type of virology specimen collection
  - Date of virology specimen sent to lab
  - Date of virology specimen received at lab
  - Adequate specimen sample
- Laboratory result
  - Date result sent to national programme
  - Results (Neg, Equiv, Measles IgM+, Rubella IgM+)
  - Measles virus detection: Positive, Negative

- Genotype of measles
- Date Genotype result of measles sent to national programme
- Rubella virus detection: Positive, Negative
- Genotype of rubella
- Date genotype result of rubella sent to national programme

- Final classification
  - Measles lab confirmed
  - Measles epidemiological link
  - Measles clinically compatible
  - Rubella lab confirmed
  - Rubella epidemiological link
  - Discarded

Annex 4 Routine measles vaccination schedules (2012) and coverage (1990–2011), by country, SEAR 1990–2011

Country	Age for MCV1	Vax Ags	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Bangladesh	38w	mr	93	93	91	88	93	92	89	83	88	81	76	75	77	74	71	71	72	69	79	78	74	69	68	65
Bhutan	9m	mr	94	95	95	95	94	99	95	90	93	87	88	78	78	78	77	71	84	85	85	81	84	86	89	93
DPR Korea*	9m	m	99	99	99	99	98	98	99	96	96	95	95	98	92	78	63	49	34	50	67	83	99	99	98	98
India	9-12m	m	74	74	74	74	74	74	69	71	59	68	62	56	57	59	58	57	55	66	72	67	59	51	43	56
Indonesia	9m	m	84	85	80	78	74	76	76	79	77	76	74	72	76	76	77	77	77	79	63	66	68	65	61	58
Maldives	9m	mmr	99	98	96	97	98	97	97	97	97	97	96	97	98	99	97	98	96	95	96	97	86	98	97	96
Myanmar	9m	m	86	84	88	88	87	82	81	78	84	86	80	77	73	84	86	89	88	86	82	77	71	68	67	68
Nepal	9m	mr	88	86	88	86	90	79	81	85	74	73	75	71	71	71	81	67	73	65	56	58	58	58	57	57
Sri Lanka	9m	mmr	99	99	99	99	97	98	98	99	99	96	99	99	99	99	95	94	94	89	87	84	86	82	79	80
Thailand	9m	mmr	99	98	98	98	98	98	96	96	96	96	96	94	94	94	96	96	93	92	91	86	80	74	79	80
Timor-Leste	9m	m	70	73	62	66	70	73	63	61	48	55	55	56												

*Democratic People's Republic of Korea

MCV1 coverage data from 2001-2013 for member states are WHO-UNICEF estimates; MCV2 coverage data is from country JRF reports

Source: Brief Status Report of South-East Asia Region on Measles and Rubella Control/Elimination, Table 1; http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tswucoveragemcv.htm and http://apps.who.int/immunization_monitoring/en/globalsummary/timeseries/tscoveragemcv2.htm. Accessed on 16 July 2014

Annex 5 History of measles and rubella supplementary immunization activities, by country, SEAR 2000–2012

Country	Year	Type	National or Sub-national	Vax Ags	Target Ages	SIA Target pop (no.)	No. vax	Cov (% of SIA target)
Bangladesh	2005–2006	Catch up	Rolling-national	m	9 M–10 Y	35 680 911	36 012 154	101
	2010	Follow Up	National	m	9–59 M	18 136 066	18 085 685	100
	2014	Catch up	National	mr	9 M–14 Y	51 745 231	53 644 603	104
Bhutan	2000	Catch Up	Sub–national	m	0 M–14 Y	214 128	214 128	100
	2006	Catch Up	National	mr	9 M–44 Y	338 040	332 041	98
DPRK*	2007	Catch Up	National	m	6 M–45 Y	16 123 376	16 109 432	100
India	2010–2013	Catch Up	Rolling–national	m	9 M–10 Y	139 490 164	118 566 640	85
Indonesia	2000–2007	Catch Up	Rolling–national	m	6M–15 Y	42 710 910	40 425 408	95
	2008–2011	Follow Up	Sub–national	m	9–59 M	59 663 573	57 235 120	96
Maldives	2005 2007	Catch Up	National	mr, mmr	6–34Y, 4–6Y	174 526	140 104	80
Myanmar	2002–2004	Catch Up	Rolling–national	m	9 M–5 Y	5 670 597	4 910 950	87
	2007	Follow Up	National	m	9 M–5 Y	6 056 000	5 706 351	94
	2012	Follow up	National	m	9 M–5 Y	6 432 064	6 267 535	97
Nepal	2004–2005	Catch Up	Rolling–national	m	9 M–15 Y	9 671 113	9 985 161	103
	2008	Follow Up	National	m	9 M–5 Y	3 903 515	3 634 277	94
	2012	Catch up	National	mr	9 M–15 Y	9 958 196	9 991 152	100
Sri Lanka	2003	Catch Up	Rolling –national	m	10–14 Y	1 987 847	1 897 173	95
	2004	Catch Up	Rolling –national	mr	16–20 Y	1 890 326	1 362 108	72
	2013	Campaign	National	m	6–12 M	176 587	173 187	98
Thailand	None							
Timor-Leste	2003–2006	Catch Up	Rolling –national		6 M–15 Y	519 005	285 126	55
	2009	Follow Up	National		9–59 M	167 136	126 823	76
	2011	Catch up	National		6 M– 14 Y	494 427	454209	92

*Democratic People's Republic of Korea

Source: Brief Status Report of South –East Asia Region on Measles and Rubella Control/Elimination, Table 7.

Annex 6 Measles case and outbreak classification and incidence, SEAR 2008–2012*

Country	Year	Population (in millions)[1]	JRF Reports		Monthly Aggregate VPD Surveillance Reports								Measles Outbreaks**				Rubella Outbreaks**			
			JRF Reported measles cases	Incidence per million pop	Suspected measles cases	Confirmed measles cases (Routine+Outbreak)				Discarded cases	Discarded / 100K pop*	Incidence per million pop.	No. outbreaks reported	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak	JRF reported rubella cases	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak
						Lab	Epi-linked	Clinical	Total											
Bangldesh	2013	154.4	237	1.5	5 321	55	156	77	288	5 033	3.3	1.9	146	7	156	22	3 034	87	2 787	32
	2012	152.4	1 986	**13.0**	8 520	560	1 092	152	1 804	6 716	4.4	**11.8**	185	33	1 092	33	3 245	66	2 683	41
	2011	150.5	5 625	**37.4**	14 856	1 445	2 802	310	4 557	10 299	6.8	**30.3**	333	91	2 802	31	5 631	89	4 744	53
	2010	148.7	788	5.3	15 200	43	–	484	527	14 673	9.9	3.5	217	0			12 963	193	12 467	65
	2009	147.0	718	4.9	15 447	30	48	562	640	14 807	10.1	4.4	170	1	48	48	13 076	145	13 076	90
	2008	145.5	2 660	**18.3**					–	–	0.0	**0.0**	81	1	132	132	5 526	59	5 526	94
Bhutan	2013	0.8	0	**0.0**	99	–	–	–	–	99	13.2	**0.0**					6			
	2012	0.8	1	1.3	85	13	–	2	15	70	9.3	**20.0**	0				2	0		
	2011	0.7	10	**13.5**	98	10	–	–	10	88	11.9	**13.5**	0				3	0		
	2010	0.7	21	**28.9**	92	21	–	5	26	66	9.1	**35.8**	1	1	13	13	9	0		
	2009	0.7	6	8.4	76	6	1	1	8	68	9.5	**11.2**	0				15			
	2008	0.7	7	10.0					–	–	0.0	**0.0**	0				2			
DPRK*	2013	24.6	0		58	–	–	8	8	50	0.2	**0.3**	0				0	ND		
	2012	24.6	0		66	–	–	–	–	66	0.3	**0.0**	ND				1	ND		
	2011	24.5	0	**0.0**	70	–	–	–	–	70	0.3	**0.0**	0				5	ND		
	2010	24.3	0	**0.0**	36	–	–	–	–	36	0.1	**0.0**	0				0	ND		
	2009	24.2	0	**0.0**	64	–	–	–	–	64	0.3	**0.0**	ND							
	2008	24.1	0	**0.0**					–	–	0.0	**0.0**	0				82			
India	2013	1 275.1	13 822	**10.8**					–	–	0.0	**0.0**	315	189	6 485	34	3 698	66	2 568	39
	2012	1 258.4	18 668	**14.8**					–	–	0.0	**0.0**	128	58	2 580	44	1 232	23	1 066	46
	2011	1 241.5	33 634	**27.1**					–	–	0.0	**0.0**	243	186	8 589	46	ND	16	777	49
	2010	1 224.6	31 458	**25.7**					–	–	0.0	**0.0**	231	186	8 240	44	ND	15	709	47
	2009	1 207.7	56 188	**46.5**					–	–	0.0	**0.0**	177	68	4 228	62	ND	56	4 454	80
	2008	1 190.9	44 258	**37.2**					–	–	0.0	**0.0**	174	101	6 364	63	ND	24	1 615	67

Country	Year	Population (in millions)[1]	JRF Reports		Monthly Aggregate VPD Surveillance Reports								Measles Outbreaks**				Rubella Outbreaks**			
			JRF Reported measles cases	Incidence per million pop	Suspected measles cases	Confirmed measles cases (Routine+Outbreak)				Discarded cases	Discarded / 100K pop*	Incidence per million pop.	No. outbreaks reported	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak	JRF reported rubella cases	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak
						Lab	Epi-linked	Clinical	Total											
Indonesia	2013	247.2	8 419	**34.1**	13 198	689	803	8 601	10 093	3 105	1.3	**40.8**	87	35	365	10	2 355	14	210	15
	2012	244.8	15 489	**63.3**	21 126	429	1 117	15 240	16 786	4 340	1.8	**68.6**	162	58	1 119	19	1 020	25	738	30
	2011	242.3	21 893	**90.3**	28 275	1 175	3 747	18 588	23 510	4 765	2.0	**97.0**	328	212	2 617	12	1 959	65	345	5
	2010	239.9	18 869	**78.7**	22 155	659	2 066	16 054	18 779	3 376	1.4	**78.3**	188	73	1 627	22	1 323	34	473	14
	2009	237.4	20 818	**87.7**	20 825	247	1 122	15 766	17 135	3 690	1.6	**72.2**	190	27	1 078	40	2 090	51	874	17
	2008	235.0	15 369	**65.4**					–	–	0.0	**0.0**	107	28	725	26	340	21	234	11
Maldives	2013	0.3	0	**0.0**					–	–	0.0	**0.0**	0				0			
	2012	0.3	0	**0.0**	–	–	–	–	–	–	0.0	**0.0**	0				0			
	2011	0.3	0	**0.0**	–	–	–	–	–	–	0.0	**0.0**	0				0			
	2010	0.3	0	**0.0**	–	–	–	–	–	–	0.0	**0.0**	0				0			
	2009	0.3	6	**19.2**	–	–	–	–	–	–	0.0	**0.0**	0				0			
	2008	0.3	2	6.5					–	–	0.0	**0.0**	0				ND			
Myanmar	2013	49.1	1 010	**20.6**	1 217	55	945	–	1 000	217	0.4	**20.4**	15	12	945	79	23	1	9	9
	2012	48.7	2 175	**44.6**	2 383	871	1 209	84	2 164	219	0.4	**44.4**	50	50	1 208	24	21	0		
	2011	48.3	2 046	**42.3**	2 500	879	873	58	1 810	690	1.4	**37.4**	38	36	842	23	103	2	22	11
	2010	48.0	190	4.0	336	48	102	–	150	186	0.4	3.1	12	9	101	11	11	0		
	2009	47.6	217	4.6	328	6	181	11	198	130	0.3	4.2	18	11	118	11	13	2	12	6
	2008	47.3	333	7.0					–	–	0.0	**0.0**	9	7	275	39	5	0		
Nepal	2013	31.5	1 861	**59.1**	324	8	–	38	46	278	0.9	1.5	3	0	0		755	0		
	2012	31.0	3 362	**108.4**	1 919	66	365	84	515	1 404	4.5	**16.6**	68	16	365	23	801	32	580	18
	2011	30.5	2 359	**77.4**	2 312	71	797	219	1 087	1 225	4.0	**35.7**	63	21	683	33	1 175	33	638	19
	2010	30.0	190	6.3	1 022	25	68	115	208	814	2.7	6.9	33	6	68	11	510	17	299	18
	2009	29.4	189	6.4	1 971	12	19	158	189	1 782	6.1	6.4	66	2	19	10	1 275	57	1 052	18
	2008	28.9	2 089	**72.3**					–	–	0.0	**0.0**	39	6	205	34	781	27	601	22
Sri Lanka	2013	21.4	2 107	**98.5**	4 058	1 759	–	1 681	3 440	618	2.9	**160.7**	1	1	2 107	2 107	24	0		
	2011	21.0	60	2.9	943	6	–	320	326	617	2.9	**15.5**	10	0			416	10	410	41
	2010	20.9	79	3.8	101	31	–	18	49	52	0.2	2.3	1	0			68	1	51	51
	2009	20.7	21	1.0	350	14	–	264	278	72	0.3	**13.5**	2	0			143	2	143	72
	2008	20.5	33	1.6					–	–	0.0	**0.0**	2	0			79	2	52	26

Country	Year	Population (in millions)[1]	JRF Reports		Monthly Aggregate VPD Surveillance Reports								Measles Outbreaks**				Rubella Outbreaks**			
			JRF Reported measles cases	Incidence per million pop	Suspected measles cases	Confirmed measles cases (Routine+Outbreak)				Discarded cases	Discarded / 100K pop*	Incidence per million pop.	No. outbreaks reported	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak	JRF reported rubella cases	No. outbreaks lab confirmed	No. cases from lab-confirmed outbreaks	Mean no. cases/ outbreak
						Lab	Epi-linked	Clinical	Total											
Thailand	2013	70.2	2 641	**37.6**	2 692	271	39	1 746	2 056	636	0.9	**29.3**	8	4	50	13	539	2	12	6
	2012	69.9	5 197	**74.4**	5 342	799	46	3 227	4 072	1 270	1.8	**58.3**	4	4	180	45	493	4	37	9
	2011	69.5	3 156	**45.4**	3 325	67	22	2 784	2 873	452	0.7	**41.3**	16	5	94	19	517	4	119	30
	2010	69.1	2 583	**37.4**	2 273	–	–	2 273	2 273	–	0.0	**32.9**	0	ND			387			
	2009	68.7	6 071	**88.4**	5 272	–	–	5 140	5 140	132	0.2	**74.8**	35	13	169	13	594	6	96	16
	2008	68.3	7 790	**114.1**					–	–	0.0	**0.0**	22	0			621	0		
Timor-Leste	2013	1.2	4	3.4	4	1	–	3	4	–	0.0	3.4	ND				0		1	
	2012	1.2	16	**13.5**	12	–	–	12	12	–	0.0	**10.1**	0				8		1	
	2011	1.2	763	**661.3**	764	–	763	1	764	–	0.0	**662.1**	1	0			0	0		
	2010	1.1	50	**44.5**	5	–	–	–	–	5	0.4	**0.0**	0				0			
	2009	1.1	10	9.1	11	–	–	–	–	11	1.0	**0.0**	0				2			
	2008	1.1	0	**0.0**					–	–	0.0	**0.0**	0				0			
SEAR	**2013**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Total	**2012**	**1 832.0**	**46 894**	**25.6**	**39 453**	**2 738**	**3 829**	**18 801**	**25 368**	**14 085**	**2.5**	**13.8**	**597**	**219**	**6 544**	**30**	**6 823**	**150**	**5 105**	**34**
	2011	**1 830.4**	**69 546**	**38.0**	**53 143**	**3 653**	**9 004**	**22 280**	**34 937**	**18 206**	**3.1**	**19.1**	**1 032**	**551**	**15 627**	**28**	**9 809**	**219**	**7 055**	**32**
	2010	**1 807.6**	**54 228**	**30.0**	**41 220**	**827**	**2 236**	**18 949**	**22 012**	**19 208**	**3.3**	**12.2**	**683**	**275**	**10 049**	**37**	**15 271**	**260**	**13 999**	**54**
	2009	**1 785.0**	**84 244**	**47.2**	**44 344**	**315**	**1 371**	**21 902**	**23 588**	**20 756**	**3.6**	**13.2**	**658**	**122**	**5 660**	**46**	**17 208**	**319**	**19 707**	**62**
	2008	**1 762.4**	**72 541**	**41.2**	**0**	**0**	**0**	**0**	**0**	**–**	**0.0**	**0.0**	**434**	**143**	**7 701**	**54**	**7 436**	**133**	**8 028**	**60**

[1] Population figures from United Nations World Population Prospects: The 2010 Revision. (For 2011 and 2012 population estimates medium fertility variant was used)

* Democratic People's Republic of Korea

**SEAR Region discarded rate excludes India population

* Reported through SEARO AERF/JRF

Annex 7A Estimated schedule, scale and cost of SIAs, SEAR 2013–2020

Country	Total Pop 2012	2013						2014					
		Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh	152 408 774	9m–14y	MR	45 701 309	32 904 942	29 705 851	$62 610 793						
Bhutan	750 443												
DPRK*	24 553 672												
India	1 231 758 096												
Indonesia	244 769 110							9m–14y	MR	64 411 293	48 308 470	41 867 340	$90 175 810
Maldives	324 313												
Myanmar	48 724 387												
Nepal	31 011 137												
Sri Lanka	21 223 550												
Thailand	69 892 142							9m–24y	MR	22 348 342	16 761 257	14 526 422	$31 287 679
Timor-Leste	1 187 194	9m–35m	M	92 609	37 970	60 196	$98 166						
Total	**1 826 602 818**	**Total**		**45 793 918**	**$32 942 912**	**$29 766 047**	**$62 708 959**	**Total**		**86 759 635**	**$65 069 726**	**$56 393 763**	**$121 463 489**

* Democratic People's Republic of Korea

Annex 7A continued

Country	2015						2016					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh							9–59m	MR	14 390 164	11 153 636	9 666 485	$20 820 121
Bhutan												
DPRK*												
India	9m–14y	M	255 214 264	63 833 959	48 881 861	$112 715 820	9–59m	M	28 345 913	7 443 921	5 700 300	13 144 221
Indonesia												
Maldives												
Myanmar	9m–14y	MR	11 188 962	8 391 722	7 272 825	$15 664 547						
Nepal	9–59m	MR	2 794 900	2 096 175	1 816 685	$3 912 860						
Sri Lanka												
Thailand	9m–14y	MR	565 408	424 056	367 515	$791 571						
	Total		**269 763 534**	**$74 745 912**	**$58 338 886**	**$133 084 798**	**Total**		**42 736 077**	**$18 597 557**	**$15 366 785**	**$33 964 342**

* Democratic People's Republic of Korea

Annex 7A continued

Country	2017						2018					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh												
Bhutan												
DPRK*												
India	9–35m	M	399 886	110 310	84 472	194 781	9–35m; 9–59m	M	49 710 755	14 411 144	11 035 561	25 446 705
Indonesia							9–59m	MR	20 193 927	16 696 481	14 470 284	$31 166 764
Maldives												
Myanmar												
Nepal												
Sri Lanka												
Thailand							9–59m	MR	231 578	191 470	165 941	$357 411
	Total		**399 886**	**$110 310**	**$84 472**	**$194 781**	**Total**		**70 136 260**	**$31 299 095**	**$25 671 785**	**$56 970 880**

* Democratic People's Republic of Korea

Annex 7A continued

Country	2019						2020					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh							9–59m	MR	11 805 878	10 383 909	8 999 388	$19 383 297
Bhutan												
DPRK*												
India	9–35m; 9–59m	M	54 716 992	16 677 940	12 771 396	29 449 336	9–35m	M	12 175 502	3 903 746	2 989 355	6 893 101
Indonesia												
Maldives												
Myanmar												
Nepal	9–59m	MR	3 522 735	3 005 127	2 604 443	$5 609 570						
Sri Lanka												
Thailand												
	Total		**58 239 727**	**$19 683 067**	**$15 375 839**	**$35 058 906**	**Total**		**23 981 380**	**$14 287 655**	**$11 988 743**	**$26 276 397**

* Democratic People's Republic of Korea

Annex 7A continued

Country	Total: 2013–2015				Total: 2016–2020				Total: 2013–2020			
	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total
Bangladesh	45 701 309	32 904 942	29 705 851	62 610 793	26 196 042	$21 537 545	$18 665 872	$40 203 418	71 897 351	$54 442 488	$48 371 723	$102 814 211
Bhutan												
DPRK*	255 214 264	63 833 959	48 881 861	112 715 820	145 349 049	42 547 061	32 581 083	75 128 144	400 563 313	$106 381 020	$81 462 943	$187 843 963
India	64 411 293	48 308 470	41 867 340	90 175 810	20 193 927	$16 696 481	$14 470 284	$31 166 764	84 605 220	$65 004 951	$56 337 624	$121 342 575
Indonesia												
Maldives												
Myanmar	11 188 962	8 391 722	7 272 825	15 664 547					11 188 962	$8 391 722	$7 272 825	$15 664 547
Nepal	2 794 900	2 096 175	1 816 685	3 912 860	3 522 735	$3 005 127	$2 604 443	$5 609 570	6 317 635	$5 101 302	$4 421 128	$9 522 430
Sri Lanka												
Thailand	22 348 342	16 761 257	14 526 422	31 287 679					22 348 342	$16 761 257	$14 526 422	$31 287 679
Timor-Leste	658 017	462 026	427 711	889 737	231 578	$191 470	$165 941	$357 411	889 595	$653 496	$593 652	$1 247 148
Total	**402 317 087**	**$172 758 550**	**$144 498 695**	**$317 257 245**	**195 493 331**	**$83 977 684**	**$68 487 623**	**$152 465 308**	**597 810 418**	**$256 736 234**	**$212 986 319**	**$469 722 553**

* Democratic People's Republic of Korea

Annex 7B Estimated schedule, scale and cost of measles and rubella SIAs, SEAR 2013–2020

Country	2013						2014					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh	9m–14y	MR	45 701 309	32 904 942	29 705 851	$62 610 793						
Bhutan												
DPRK*												
India												
Indonesia							9m–14y	MR	64 411 293	48 308 470	41 867 340	$90 175 810
Maldives												
Myanmar												
Nepal												
Sri Lanka												
Thailand							9m–24y	MR	22 348 342	16 761 257	14 526 422	$31 287 679
Timor-Leste	9–35m	M	92 609	37 970	60 196	$98 166						
	Total		**45 793 918**	**$32 942 912**	**$29 766 047**	**$62 708 959**	**Total**		**86 759 635**	**$65 069 726**	**$56 393 763**	**$121 463 489**

* Democratic People's Republic of Korea

Annex 7B continued

Country	2015						2016					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh							9–59m	MR	14 390 164	11 153 636	9 666 485	$20 820 121
Bhutan												
DPRK*												
India	9m–14yr; 9-59m	MR	255 214 264	127 667 918	48 881 861	$176 549 779	9–59m	MR	28 345 913	14 887 842	5 700 300	20 588 142
Indonesia												
Maldives												
Myanmar	9m–14y	MR	11 188 962	8 391 722	7 272 825	$15 664 547						
Nepal	9m–59m	MR	2 794 900	2 096 175	1 816 685	$3 912 860						
Sri Lanka												
Thailand												
Timor-Leste	9m–14y	MR	565 408	424 056	367 515	$791 571						
	Total		**269 763 534**	**$138 579 871**	**$58 338 886**	**$196 918 757**	**Total**		**42 736 077**	**$26 041 479**	**$15 366 785**	**$41 408 263**

* Democratic People's Republic of Korea

Annex 7B continued

Country	2017						2018					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh												
Bhutan												
DPRK*												
India	9–35m	MR	399 886	220 620	84 472	305 091	9–35m; 9–59m	MR	49 710 755	25 497 042	11 035 561	36 532 602
Indonesia							9m–59m	MR	20 193 927	16 696 481	14 470 284	$31 166 764
Maldives												
Myanmar												
Nepal												
Sri Lanka												
Thailand												
Timor-Leste							9m–59m	MR	231 578	191 470	165 941	$357 411
	Total		**399 886**	**$220 620**	**$84 472**	**$305 091**	**Total**		**70 136 260**	**$42 384 993**	**$25 671 785**	**$68 056 778**

* Democratic People's Republic of Korea

Annex 7B continued

Country	2019						2020					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh							9–59m	MR	11 805 878	10 383 909	8 999 388	$19 383 297
Bhutan												
DPRK*												
India	9–35m; 9–59m	MR	54 716 992	33 355 880	12 771 396	46 127 276	9–35m	MR	12 175 502	7 807 492	2 989 355	10 796 847
Indonesia												
Maldives												
Myanmar												
Nepal	9m–59m	MR	3 522 735	3 005 127	2 604 443	$5 609 570						
Sri Lanka												
Thailand												
Timor-Leste												
	Total		**58 239 727**	**$36 361 007**	**$15 375 839**	**$51 736 846**	**Total**		**23 981 380**	**$18 191 401**	**$11 988 743**	**$30 180 143**

* Democratic People's Republic of Korea

Annex 7B continued

Country	Total: 2013–2015				Total: 2016–2020				Total: 2013–2020			
	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total
Bangladesh	45 701 309	32 904 942	29 705 851	62 610 793	26 196 042	$21 537 545	$18 665 872	$40 203 418	71 897 351	$54 442 488	$48 371 723	$102 814 211
Bhutan												
DPRK*												
India	255 214 264	127 667 918	48 881 861	176 549 779	145 349 049	81 768 876	32 581 083	114 349 959	400 563 313	$209 436 794	$81 462 943	$290 899 737
Indonesia	64 411 293	48 308 470	41 867 340	90 175 810	20 193 927	$16 696 481	$14 470 284	$31 166 764	84 605 220	$65 004 951	$56 337 624	$121 342 575
Maldives												
Myanmar	11 188 962	8 391 722	7 272 825	15 664 547					11 188 962	$8 391 722	$7 272 825	$15 664 547
Nepal	2 794 900	2 096 175	1 816 685	3 912 860	3 522 735	$3 005 127	$2 604 443	$5 609 570	6 317 635	$5 101 302	$4 421 128	$9 522 430
Sri Lanka												
Thailand	22 348 342	16 761 257	14 526 422	31 287 679					22 348 342	$16 761 257	$14 526 422	$31 287 679
Timor-Leste	658 017	462 026	427 711	889 737	231 578	$191 470	$165 941	$357 411	889 595	$653 496	$593 652	$1 247 148
Total	**402 317 087**	**$236 592 509**	**$144 498 695**	**$381 091 204**	**195 493 331**	**$123 199 499**	**$68 487 623**	**$191 687 122**	**597 810 418**	**$359 792 008**	**$212 986 319**	**$572 778 327**

* Democratic People's Republic of Korea

Annex 8A Estimated schedule, scale and cost of SIAs,* by state, India 2015–2020

State/Union Territory	2015						2016					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	9m–14y	M	97 798	24 461	18 731	43 192						
Andhra Pradesh	9m–14y	M	21 307 862	5 329 503	4 081 151	9 410 654						
Arunachal Pradesh	9m–14y	M	480 388	120 154	92 010	212 164						
Assam	9m–14y	M	9 575 028	2 394 897	1 833 930	4 228 828						
Bihar	9m–14y	M	38 764 439	9 695 726	7 424 655	17 120 381						
Chandigarh	9m–14y	M	315 984	79 034	60 521	139 555						
Chhattisgarh	9–59m	M	2 483 466	621 162	475 665	1 096 827						
Dadra And Nagar Haveli	9m–14y	M	107 193	26 811	20 531	47 342						
Daman And Diu	9m–14y	M	75 946	18 996	14 546	33 542						
Delhi	9m–14y	M	4 626 326	1 157 132	886 092	2 043 225						
Goa	None					0						
Gujarat	9m–14y	M	16 738 783	4 186 689	3 206 023	7 392 712						
Haryana	9–59m	M	2 294 053	573 786	439 386	1 013 172						
Himachal Pradesh	9m–14y	M	1 694 268	423 769	324 508	748 276						
Jammu and Kashmir	9m–14y	M	3 223 917	806 363	617 485	1 423 848						
Jharkhand	9m–14y	M	11 141 485	2 786 698	2 133 958	4 920 656						
Karnataka	9m–14y	M	15 505 369	3 878 189	2 969 784	6 847 973						
Kerala	9m–14y	M	7 611 779	1 903 851	1 457 904	3 361 755						
Lakshadweep	9m–14y	M	19 577	4 897	3 750	8 646						
Madhya Pradesh	9m–14y	M	23 169 792	5 795 207	4 437 771	10 232 979						
Maharashtra	9m–14y	M	29 352 642	7 341 656	5 621 989	12 963 645						
Manipur	9–59m	M	291 446	72 896	55 821	128 717						
Meghalaya	9m–14y	M	1 029 844	257 584	197 249	454 832						
Mizoram	9m–14y	M	379 073	94 813	72 605	167 418						
Nagaland	9m–14y	M	688 160	172 122	131 805	303 927						
Odisha	9m–14y	M	11 742 297	2 936 973	2 249 033	5 186 006						
Pondicherry	9m–14y	M	320 325	80 119	61 353	141 472						
Punjab	9m–14y	M	6 854 969	1 714 559	1 312 950	3 027 509						
Rajasthan						0	9–59m	M	7 106 374	1 866 205	1 429 076	3 295 281
Sikkim	9m–14y	M	211 141	52 810	40 440	93 251						
Tamil Nadu	9m–14y	M	16 501 488	4 127 337	3 160 573	7 287 910						
Tripura	9m–14y	M	1 275 500	319 027	244 300	563 327						
Uttar Pradesh						0	9–59m	M	21 239 539	5 577 716	4 271 224	9 848 940
Uttarakhand	9m–14y	M	3 513 548	878 805	672 959	1 551 765						
West Bengal	9m–14y	M	23 820 379	5 957 931	4 562 380	10 520 311						
Total			**255 214 264**	**$63 833 959**	**$48 881 861**	**$112 715 820**			**28 345 913**	**$7 443 921**	**$5 700 300**	**$13 144 221**

* Assumes India uses monovalent measles vaccine

Annex 8A continued

State/Union Territory	2017						2018					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands												
Andhra Pradesh												
Arunachal Pradesh	9–35m	M	84 877	23 414	17 929	41 343						
Assam							9–59m	M	3 178 545	921 460	705 622	1 627 082
Bihar							9–59m	M	14 209 273	4 119 267	3 154 394	7 273 661
Chandigarh												
Chhattisgarh												
Dadra And Nagar Haveli												
Daman And Diu												
Delhi												
Goa												
Gujarat							9–59m	M	5 438 688	1 576 675	1 207 364	2 784 039
Haryana							9–59m	M	2 433 777	705 552	540 287	1 245 839
Himachal Pradesh												
Jammu and Kashmir							9–59m	M	1 018 987	295 404	226 210	521 615
Jharkhand							9–59m	M	3 765 013	1 091 477	835 816	1 927 293
Karnataka												
Kerala												
Lakshadweep												
Madhya Pradesh							9–59m	M	7 838 946	2 272 510	1 740 210	4 012 720
Maharashtra												
Manipur												
Meghalaya							9–59m	M	357 203	103 553	79 297	182 850
Mizoram												
Nagaland	9–35m	M	103 982	28 684	21 965	50 649						
Odisha												
Pondicherry												
Punjab												
Rajasthan												
Sikkim												
Tamil Nadu												
Tripura	9–35m	M	211 026	58 212	44 577	102 789						
Uttar Pradesh							9–35m	M	11 470 325	3 325 246	2 546 360	5 871 606
Uttarakhand												
West Bengal												
Total			**399 886**	**$110 310**	**$84 472**	**$194 781**			**49 710 755**	**$14 411 144**	**$11 035 561**	**$25 446 705**

Annex 8A continued

State/Union Territory	2019						2020					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	9–59m	M	28 612	8 721	6 678	15 399						
Andhra Pradesh	9–59m	M	6 601 466	2 012 151	1 540 836	3 552 987						
Arunachal Pradesh	9–35m	M	89 335	27 230	20 852	48 081						
Assam												
Bihar												
Chandigarh	9–59m	M	98 569	30 044	23 007	53 051						
Chhattisgarh	9–59m	M	2 715 593	827 723	633 842	1 461 565						
Dadra And Nagar Haveli	9–59m	M	48 933	14 915	11 421	26 337						
Daman And Diu												
Delhi	9–59m	M	1 577 968	480 970	368 311	849 281						
Goa												
Gujarat												
Haryana												
Himachal Pradesh												
Jammu and Kashmir												
Jharkhand												
Karnataka	9–59m	M	5 049 814	1 539 202	1 178 668	2 717 870						
Kerala												
Lakshadweep	9–59m	M	5 813	1 772	1 357	3 129						
Madhya Pradesh												
Maharashtra	9–59m	M	9 903 255	3 018 549	2 311 501	5 330 050						
Manipur	9–59m	M	313 806	95 649	73 245	168 894						
Meghalaya												
Mizoram	9–59m	M	129 928	39 602	30 326	69 929						
Nagaland	9–35m	M	196 225	59 810	45 801	105 611						
Odisha	9–59m	M	3 773 098	1 150 054	880 672	2 030 726						
Pondicherry	9–59m	M	110 583	33 706	25 811	59 517						
Punjab	9–59m	M	2 139 922	652 256	499 475	1 151 731						
Rajasthan	9–59m	M	7 573 274	2 308 362	1 767 664	4 076 026						
Sikkim	9–59m	M	66 674	20 323	15 562	35 885						
Tamil Nadu	9–59m	M	5 430 229	1 655 154	1 267 460	2 922 614						
Tripura	9–35m	M	217 297	66 233	50 719	116 952						
Uttar Pradesh							9–35m	M	12 175 502	3 903 746	2 989 355	6 893 101
Uttarakhand	9–59m	M	1 181 177	360 027	275 696	635 723						
West Bengal	9–59m	M	7 465 421	2 275 488	1 742 491	4 017 978						
Total			**54 716 992**	**$16 677 940**	**$12 771 396**	**$29 449 336**			**12 175 502**	**$3 903 746**	**$2 989 355**	**$6 893 101**

Annex 8A continued

State/Union Territory	Total: 2013–2015				Total: 2016–2020				Total: 2013–2020			
	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	97 798	24 461	18 731	43 192	28 612	8 721	6 678	15 399	126 410	33 182	25 410	**$58 592**
Andhra Pradesh	21 307 862	5 329 503	4 081 151	9 410 654	6 601 466	2 012 151	1 540 836	3 552 987	27 909 328	7 341 654	5 621 987	**$12 963 641**
Arunachal Pradesh	480 388	120 154	92 010	212 164	174 212	50 643	38 781	89 424	654 600	170 798	130 791	**$301 588**
Assam	9 575 028	2 394 897	1 833 930	4 228 828	3 178 545	921 460	705 622	1 627 082	12 753 573	3 316 357	2 539 553	**$5 855 910**
Bihar	38 764 439	9 695 726	7 424 655	17 120 381	14 209 273	4 119 267	3 154 394	7 273 661	52 973 711	13 814 993	10 579 049	**$24 394 042**
Chandigarh	315 984	79 034	60 521	139 555	98 569	30 044	23 007	53 051	414 553	109 078	83 528	**$192 606**
Chhattisgarh	2 483 466	621 162	475 665	1 096 827	2 715 593	827 723	633 842	1 461 565	5 199 060	1 448 885	1 109 507	**$2 558 392**
Dadra And Nagar Haveli	107 193	26 811	20 531	47 342	48 933	14 915	11 421	26 337	156 126	41 726	31 952	**$73 679**
Daman And Diu	75 946	18 996	14 546	33 542	0	0	0	0	75 946	18 996	14 546	**$33 542**
Delhi	4 626 326	1 157 132	886 092	2 043 225	1 577 968	480 970	368 311	849 281	6 204 294	1 638 103	1 254 403	**$2 892 506**
Goa	0	0	0	0	0	0	0	0	0	0	0	**$0**
Gujarat	16 738 783	4 186 689	3 206 023	7 392 712	5 438 688	1 576 675	1 207 364	2 784 039	22 177 471	5 763 364	4 413 387	**$10 176 752**
Haryana	2 294 053	573 786	439 386	1 013 172	2 433 777	705 552	540 287	1 245 839	4 727 830	1 279 338	979 673	**$2 259 012**
Himachal Pradesh	1 694 268	423 769	324 508	748 276	0	0	0	0	1 694 268	423 769	324 508	**$748 276**
Jammu and Kashmir	3 223 917	806 363	617 485	1 423 848	1 018 987	295 404	226 210	521 615	4 242 904	1 101 767	843 696	**$1 945 463**
Jharkhand	11 141 485	2 786 698	2 133 958	4 920 656	3 765 013	1 091 477	835 816	1 927 293	14 906 497	3 878 175	2 969 774	**$6 847 948**
Karnataka	15 505 369	3 878 189	2 969 784	6 847 973	5 049 814	1 539 202	1 178 668	2 717 870	20 555 183	5 417 391	4 148 452	**$9 565 843**
Kerala	7 611 779	1 903 851	1 457 904	3 361 755	0	0	0	0	7 611 779	1 903 851	1 457 904	**$3 361 755**
Lakshadweep	19 577	4 897	3 750	8 646	5 813	1 772	1 357	3 129	25 390	6 668	5 106	**$11 775**
Madhya Pradesh	23 169 792	5 795 207	4 437 771	10 232 979	7 838 946	2 272 510	1 740 210	4 012 720	31 008 738	8 067 717	6 177 982	**$14 245 699**
Maharashtra	29 352 642	7 341 656	5 621 989	12 963 645	9 903 255	3 018 549	2 311 501	5 330 050	39 255 897	10 360 205	7 933 490	**$18 293 695**
Manipur	291 446	72 896	55 821	128 717	313 806	95 649	73 245	168 894	605 252	168 545	129 066	**$297 612**
Meghalaya	1 029 844	257 584	197 249	454 832	357 203	103 553	79 297	182 850	1 387 047	361 137	276 546	**$637 683**
Mizoram	379 073	94 813	72 605	167 418	129 928	39 602	30 326	69 929	509 001	134 416	102 931	**$237 347**
Nagaland	688 160	172 122	131 805	303 927	300 208	88 494	67 766	156 260	988 368	260 616	199 571	**$460 187**
Odisha	11 742 297	2 936 973	2 249 033	5 186 006	3 773 098	1 150 054	880 672	2 030 726	15 515 395	4 087 027	3 129 705	**$7 216 732**
Pondicherry	320 325	80 119	61 353	141 472	110 583	33 706	25 811	59 517	430 908	113 826	87 164	**$200 989**
Punjab	6 854 969	1 714 559	1 312 950	3 027 509	2 139 922	652 256	499 475	1 151 731	8 994 891	2 366 815	1 812 426	**$4 179 240**
Rajasthan	0	0	0	0	14 679 648	4 174 567	3 196 740	7 371 307	14 679 648	4 174 567	3 196 740	**$7 371 307**
Sikkim	211 141	52 810	40 440	93 251	66 674	20 323	15 562	35 885	277 815	73 133	56 003	**$129 136**
Tamil Nadu	16 501 488	4 127 337	3 160 573	7 287 910	5 430 229	1 655 154	1 267 460	2 922 614	21 931 717	5 782 491	4 428 034	**$10 210 524**
Tripura	1 275 500	319 027	244 300	563 327	428 323	124 445	95 296	219 741	1 703 823	443 472	339 596	**$783 068**
Uttar Pradesh	0	0	0	0	44 885 366	12 806 708	9 806 939	22 613 647	44 885 366	12 806 708	9 806 939	**$22 613 647**
Uttarakhand	3 513 548	878 805	672 959	1 551 765	1 181 177	360 027	275 696	635 723	4 694 725	1 238 832	948 655	**$2 187 488**
West Bengal	23 820 379	5 957 931	4 562 380	10 520 311	7 465 421	2 275 488	1 742 491	4 017 978	31 285 800	8 233 419	6 304 870	**$14 538 290**
Total	**255 214 264**	**$63 833 959**	**$48 881 861**	**$112 715 820**	**145 349 049**	**$42 547 061**	**$32 581 083**	**$75 128 144**	**400 563 313**	**$106 381 020**	**$81 462 943**	**$187 843 963**

Annex 8B Estimated schedule, scale and cost of SIAs,* by state, India 2015–2020

State/Union Territory	2015						2016					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	9m–14y	MR	97 798	48 922	18 731	67 654						
Andhra Pradesh	9m–14y	MR	21 307 862	10 659 006	4 081 151	14 740 157						
Arunachal Pradesh	9m–14y	MR	480 388	240 309	92 010	332 319						
Assam	9m–14y	MR	9 575 028	4 789 795	1 833 930	6 623 725						
Bihar	9m–14y	MR	38 764 439	19 391 452	7 424 655	26 816 107						
Chandigarh	9m–14y	MR	315 984	158 067	60 521	218 588						
Chhattisgarh	9–59m	MR	2 483 466	1 242 325	475 665	1 717 989						
Dadra And Nagar Haveli	9m–14y	MR	107 193	53 622	20 531	74 153						
Daman And Diu	9m–14y	MR	75 946	37 991	14 546	52 537						
Delhi	9m–14y	MR	4 626 326	2 314 265	886 092	3 200 357						
Goa	None			0		0						
Gujarat	9m–14y	MR	16 738 783	8 373 378	3 206 023	11 579 401						
Haryana	9–59m	MR	2 294 053	1 147 573	439 386	1 586 959						
Himachal Pradesh	9m–14y	MR	1 694 268	847 537	324 508	1 172 045						
Jammu and Kashmir	9m–14y	MR	3 223 917	1 612 726	617 485	2 230 212						
Jharkhand	9m–14y	MR	11 141 485	5 573 396	2 133 958	7 707 354						
Karnataka	9m–14y	MR	15 505 369	7 756 378	2 969 784	10 726 162						
Kerala	9m–14y	MR	7 611 779	3 807 702	1 457 904	5 265 607						
Lakshadweep	9m–14y	MR	19 577	9 793	3 750	13 543						
Madhya Pradesh	9m–14y	MR	23 169 792	11 590 415	4 437 771	16 028 186						
Maharashtra	9m–14y	MR	29 352 642	14 683 312	5 621 989	20 305 301						
Manipur	9–59m	MR	291 446	145 792	55 821	201 614						
Meghalaya	9m–14y	MR	1 029 844	515 167	197 249	712 416						
Mizoram	9m–14y	MR	379 073	189 627	72 605	262 232						
Nagaland	9m–14y	MR	688 160	344 244	131 805	476 049						
Odisha	9m–14y	MR	11 742 297	5 873 945	2 249 033	8 122 978						
Pondicherry	9m–14y	MR	320 325	160 239	61 353	221 592						
Punjab	9m–14y	MR	6 854 969	3 429 117	1 312 950	4 742 067						
Rajasthan				0		0	9–59m	MR	7 106 374	3 732 410	1 429 076	5 161 486
Sikkim	9m–14y	MR	211 141	105 621	40 440	146 061						
Tamil Nadu	9m–14y	MR	16 501 488	8 254 674	3 160 573	11 415 247						
Tripura	9m–14y	MR	1 275 500	638 054	244 300	882 354						
Uttar Pradesh				0		0	9–59m	MR	21 239 539	11 155 432	4 271 224	15 426 656
Uttarakhand	9m–14y	MR	3 513 548	1 757 611	672 959	2 430 570						
West Bengal	9m–14y	MR	23 820 379	11 915 863	4 562 380	16 478 243						
Total			**255 214 264**	**127 667 918**	**48 881 861**	**176 549 779**			**28 345 913**	**14 887 842**	**5 700 300**	**20 588 142**

* Assumes India uses monovalent measles vaccine

Annex 8B continued

State/Union Territory	2017						2018					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman And Nicobar Islands												
Andhra Pradesh												
Arunachal Pradesh	9–35m	MR	84 877	46 827	17 929	64 757						
Assam							9–59m	MR	3 178 545	1 842 920	705 622	2 548 542
Bihar							9–59m	MR	14 209 273	8 238 534	3 154 394	11 392 928
Chandigarh												
Chhattisgarh												
Dadra And Nagar Haveli												
Daman And Diu												
Delhi												
Goa												
Gujarat							9–59m	MR	5 438 688	3 153 351	1 207 364	4 360 715
Haryana							9–59m	MR	2 433 777	1 411 103	540 287	1 951 391
Himachal Pradesh												
Jammu and Kashmir							9–59m	MR	1 018 987	590 808	226 210	817 019
Jharkhand							9–59m	MR	3 765 013	2 182 954	835 816	3 018 769
Karnataka												
Kerala												
Lakshadweep												
Madhya Pradesh							9–59m	MR	7 838 946	4 545 019	1 740 210	6 285 230
Maharashtra												
Manipur												
Meghalaya							9-59m	MR	357 203	207 106	79 297	286 403
Mizoram												
Nagaland	9–35m	MR	103 982	57 368	21 965	79 333						
Odisha												
Pondicherry												
Punjab												
Rajasthan												
Sikkim												
Tamil Nadu												
Tripura	9–35m	MR	211 026	116 425	44 577	161 002						
Uttar Pradesh							9–35m	MR	11 470 325	3 325 246	2 546 360	5 871 606
Uttarakhand												
West Bengal												
Total			**399 886**	**220 620**	**84 472**	**305 091**			**49 710 755**	**25 497 042**	**11 035 561**	**36 532 602**

Annex 8B continued

State/Union Territory	2019						2020					
	Age	Ag	Target Pop	Bundled vaccine	Ops	Total	Age	Ag	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	9–59m	MR	28 612	17 442	6 678	24 120						
Andhra Pradesh	9–59m	MR	6 601 466	4 024 302	1 540 836	5 565 138						
Arunachal Pradesh	9–35m	MR	89 335	54 459	20 852	75 311						
Assam												
Bihar												
Chandigarh	9–59m	MR	98 569	60 088	23 007	83 095						
Chhattisgarh	9–59m	MR	2 715 593	1 655 446	633 842	2 289 287						
Dadra and Nagar Haveli	9–59m	MR	48 933	29 830	11 421	41 252						
Daman And Diu												
Delhi	9–59m	MR	1 577 968	961 941	368 311	1 330 251						
Goa												
Gujarat												
Haryana												
Himachal Pradesh												
Jammu and Kashmir												
Jharkhand												
Karnataka	9–59m	MR	5 049 814	3 078 404	1 178 668	4 257 072						
Kerala												
Lakshadweep	9–59m	MR	5 813	3 544	1 357	4 900						
Madhya Pradesh												
Maharashtra	9–59m	MR	9 903 255	6 037 097	2 311 501	8 348 598						
Manipur	9–59m	MR	313 806	191 298	73 245	264 543						
Meghalaya												
Mizoram	9–59m	MR	129 928	79 205	30 326	109 531						
Nagaland	9–35m	MR	196 225	119 620	45 801	165 421						
Odisha	9–59m	MR	3 773 098	2 300 108	880 672	3 180 780						
Pondicherry	9–59m	MR	110 583	67 412	25 811	93 223						
Punjab	9–59m	MR	2 139 922	1 304 512	499 475	1 803 987						
Rajasthan	9–59m	MR	7 573 274	4 616 723	1 767 664	6 384 388						
Sikkim	9–59m	MR	66 674	40 645	15 562	56 207						
Tamil Nadu	9–59m	MR	5 430 229	3 310 308	1 267 460	4 577 768						
Tripura	9–35m	MR	217 297	132 466	50 719	183 185						
Uttar Pradesh							9–35m	MR	12 175 502	7 807 492	2 989 355	10 796 847
Uttarakhand	9–59m	MR	1 181 177	720 054	275 696	995 750						
West Bengal	9–59m	MR	7 465 421	4 550 975	1 742 491	6 293 466						
Total			**54 716 992**	**33 355 880**	**12 771 396**	**46 127 276**			**12 175 502**	**7 807 492**	**2 989 355**	**10 796 847**

Annex 8B continued

State/Union Territory	Total: 2013–2015				Total: 2016–2020				Total: 2013–2020			
	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total	Target Pop	Bundled vaccine	Ops	Total
Andaman and Nicobar Islands	97 798	48 922	18 731	67 654	28 612	17 442	6 678	24 120	126 410	66 364	25 410	91 774
Andhra Pradesh	21 307 862	10 659 006	4 081 151	14 740 157	6 601 466	4 024 302	1 540 836	5 565 138	27 909 328	14 683 308	5 621 987	20 305 295
Arunachal Pradesh	480 388	240 309	92 010	332 319	174 212	101 287	38 781	140 067	654 600	341 595	130 791	472 386
Assam	9 575 028	4 789 795	1 833 930	6 623 725	3 178 545	1 842 920	705 622	2 548 542	12 753 573	6 632 715	2 539 553	9 172 267
Bihar	38 764 439	19 391 452	7 424 655	26 816 107	14 209 273	8 238 534	3 154 394	11 392 928	52 973 711	27 629 986	10 579 049	38 209 035
Chandigarh	315 984	158 067	60 521	218 588	98 569	60 088	23 007	83 095	414 553	218 155	83 528	301 683
Chhattisgarh	2 483 466	1 242 325	475 665	1 717 989	2 715 593	1 655 446	633 842	2 289 287	5 199 060	2 897 770	1 109 507	4 007 277
Dadra and Nagar Haveli	107 193	53 622	20 531	74 153	48 933	29 830	11 421	41 252	156 126	83 452	31 952	115 405
Daman and Diu	75 946	37 991	14 546	52 537	0	0	0	0	75 946	37 991	14 546	52 537
Delhi	4 626 326	2 314 265	886 092	3 200 357	1 577 968	961 941	368 311	1 330 251	6 204 294	3 276 206	1 254 403	4 530 609
Goa	0	0	0	0	0	0	0	0	0	0	0	0
Gujarat	16 738 783	8 373 378	3 206 023	11 579 401	5 438 688	3 153 351	1 207 364	4 360 715	22 177 471	11 526 729	4 413 387	15 940 116
Haryana	2 294 053	1 147 573	439 386	1 586 959	2 433 777	1 411 103	540 287	1 951 391	4 727 830	2 558 676	979 673	3 538 350
Himachal Pradesh	1 694 268	847 537	324 508	1 172 045	0	0	0	0	1 694 268	847 537	324 508	1 172 045
Jammu and Kashmir	3 223 917	1 612 726	617 485	2 230 212	1 018 987	590 808	226 210	817 019	4 242 904	2 203 535	843 696	3 047 230
Jharkhand	11 141 485	5 573 396	2 133 958	7 707 354	3 765 013	2 182 954	835 816	3 018 769	14 906 497	7 756 350	2 969 774	10 726 123
Karnataka	15 505 369	7 756 378	2 969 784	10 726 162	5 049 814	3 078 404	1 178 668	4 257 072	20 555 183	10 834 781	4 148 452	14 983 233
Kerala	7 611 779	3 807 702	1 457 904	5 265 607	0	0	0	0	7 611 779	3 807 702	1 457 904	5 265 607
Lakshadweep	19 577	9 793	3 750	13 543	5 813	3 544	1 357	4 900	25 390	13 337	5 106	18 443
Madhya Pradesh	23 169 792	11 590 415	4 437 771	16 028 186	7 838 946	4 545 019	1 740 210	6 285 230	31 008 738	16 135 434	6 177 982	22 313 416
Maharashtra	29 352 642	14 683 312	5 621 989	20 305 301	9 903 255	6 037 097	2 311 501	8 348 598	39 255 897	20 720 409	7 933 490	28 653 899
Manipur	291 446	145 792	55 821	201 614	313 806	191 298	73 245	264 543	605 252	337 091	129 066	466 157
Meghalaya	1 029 844	515 167	197 249	712 416	357 203	207 106	79 297	286 403	1 387 047	722 273	276 546	998 820
Mizoram	379 073	189 627	72 605	262 232	129 928	79 205	30 326	109 531	509 001	268 832	102 931	371 763
Nagaland	688 160	344 244	131 805	476 049	300 208	176 988	67 766	244 754	988 368	521 232	199 571	720 803
Odisha	11 742 297	5 873 945	2 249 033	8 122 978	3 773 098	2 300 108	880 672	3 180 780	15 515 395	8 174 053	3 129 705	11 303 759
Pondicherry	320 325	160 239	61 353	221 592	110 583	67 412	25 811	93 223	430 908	227 651	87 164	314 815
Punjab	6 854 969	3 429 117	1 312 950	4 742 067	2 139 922	1 304 512	499 475	1 803 987	8 994 891	4 733 629	1 812 426	6 546 055
Rajasthan	0	0	0	0	14 679 648	8 349 134	3 196 740	11 545 874	14 679 648	8 349 134	3 196 740	11 545 874
Sikkim	211 141	105 621	40 440	146 061	66 674	40 645	15 562	56 207	277 815	146 266	56 003	202 269
Tamil Nadu	16 501 488	8 254 674	3 160 573	11 415 247	5 430 229	3 310 308	1 267 460	4 577 768	21 931 717	11 564 982	4 428 034	15 993 015
Tripura	1 275 500	638 054	244 300	882 354	428 323	248 890	95 296	344 186	1 703 823	886 944	339 596	1 226 540
Uttar Pradesh	0	0	0	0	44 885 366	22 288 170	9 806 939	32 095 109	44 885 366	22 288 170	9 806 939	32 095 109
Uttarakhand	3 513 548	1 757 611	672 959	2 430 570	1 181 177	720 054	275 696	995 750	4 694 725	2 477 665	948 655	3 426 320
West Bengal	23 820 379	11 915 863	4 562 380	16 478 243	7 465 421	4 550 975	1 742 491	6 293 466	31 285 800	16 466 838	6 304 870	22 771 709
Total	**255 214 264**	**127 667 918**	**48 881 861**	**176 549 779**	**145 349 049**	**81 768 876**	**32 581 083**	**114 349 959**	**400 563 313**	**209 436 794**	**81 462 943**	**290 899 737**

Annex 9 Estimated costs for outbreak response immunization,* by country, SEAR 2016–2020

Country	2016					2017					2018				
	Ag	Target Pop	Bundled vaccine	Ops	Total	Ag	Target Pop	Bundled vaccine	Ops	Total	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh						MR	716 348	573 655	497 168	$1 070 823	MR	708 315	585 639	507 554	$1 093 194
Bhutan	MR	3 556	2 756	2 388	$5 144	MR	3 541	2 835	2 457	$5 293	MR	3 504	2 897	2 510	$5 407
DPRK**	MR	85 662	66 395	57 543	$123 938	MR	86 256	69 074	59 864	$128 938	MR	86 840	71 800	62 227	$134 027
India															
Indonesia	MR	1 031 389	799 417	692 828	$1 492 244	MR	1 022 067	818 476	709 346	$1 527 822	MR	1 009 696	834 824	723 514	$1 558 338
Maldives	MR	1 337	1 036	898	$1 935	MR	1 330	1 065	923	$1 988	MR	1 313	1 086	941	$2 026
Myanmar	MR	192 177	148 954	129 094	$278 048	MR	190 910	152 881	132 497	$285 379	MR	189 767	156 901	135 981	$292 882
Nepal	MR	176 980	137 175	118 885	$256 060	MR	177 515	142 155	123 201	$265 356	MR	176 937	146 293	126 787	$273 081
Sri Lanka	MR	86 581	67 108	58 160	$125 268	MR	84 973	68 047	58 974	$127 021	MR	83 870	69 344	60 098	$129 443
Thailand	MR	198 666	153 983	133 452	$287 436	MR	195 737	156 747	135 848	$292 595	MR	192 659	159 292	138 053	$297 345
Timor-Leste	MR	10 843	8 405	7 284	$15 689	MR	11 161	8 938	7 746	$16 684	MR	11 579	9 574	8 297	$17 871
Total		**1 787 191**	**$1 385 229**	**$1 200 532**	**$2 585 761**		**2 489 838**	**$1 993 874**	**$1 728 024**	**$3 721 898**		**2 464 481**	**$2 037 650**	**$1 765 963**	**$3 803 613**

* Assuming all countries use MR vaccine

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Annex 9 continued

Country	2019					2020					Total: 2016–2020				
	Ag	Target Pop	Bundled vaccine	Ops	Total	Ag	Target Pop	Bundled vaccine	Ops	Total	Ag	Target Pop	Bundled vaccine	Ops	Total
Bangladesh	MR	699 261	524 445	454 519	$978 965	MR	691 960	535 084	463 740	$998 824	MR	2 815 884	2 218 824	1 922 981	**4 141 806**
Bhutan	MR	3 459	2 594	2 248	$4 843	MR	3 418	2 643	2 291	$4 934	MR	17 476	13 725	11 895	**25 620**
DPRK**	MR	87 403	65 553	56 812	$122 365	MR	87 951	68 012	58 943	$126 955	MR	434 113	340 834	295 389	**636 223**
India	MR	3 625 047	1 805 626	846 116	2 651 742	MR	7 164 600	4 594 271	1 759 068	6 353 339	MR	10 789 647	6 399 897	2 605 183	**9 005 080**
Indonesia	MR	996 996	747 747	648 047	$1 395 794	MR	985 855	762 350	660 703	$1 423 052	MR	5 046 003	3 962 813	3 434 438	**7 397 251**
Maldives	MR	1 291	968	839	$1 808	MR	1 269	981	850	$1 831	MR	6 540	5 137	4 452	**9 588**
Myanmar	MR	188 561	141 420	122 564	$263 985	MR	187 186	144 748	125 449	$270 197	MR	948 601	744 905	645 585	**1 390 490**
Nepal	MR	176 137	132 103	114 489	$246 591	MR	175 771	135 921	117 798	$253 719	MR	883 340	693 647	601 160	**1 294 807**
Sri Lanka	MR	82 848	62 136	53 851	$115 988	MR	81 601	63 101	54 688	$117 789	MR	419 874	329 737	285 772	**615 509**
Thailand	MR	189 743	142 308	123 333	$265 641	MR	187 204	144 762	125 461	$270 223	MR	964 009	757 092	656 147	**1 413 239**
Timor-Leste	MR	12 005	9 004	7 803	$16 807	MR	12 378	9 572	8 295	$17 867	MR	57 966	45 491	39 426	**84 917**
Total		**6 062 750**	**$3 633 904**	**$2 430 623**	**$6 064 527**		**9 579 193**	**$6 461 445**	**$3 377 285**	**$9 838 730**		**22 383 452**	**$15 512 102**	**$10 502 428**	**$26 014 530**

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Annex 10 Estimated measles and rubella surveillance costs, SEAR 2013–2020

Country	2013									2014								
	Expected no. of susp cases @ 4/100K*	Investigation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total	Expected no. of susp cases @ 4/100K*	Investigation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	6 176	$203 800	$98 812	$51 610	$354 222	44 570	$5 000	$567 500	$971 292	6 255	$206 422	$100 083	$51 610	$358 115	44 570	$5 000	$567 500	$975 185
Bhutan	30	$1 006	$488	$6 537	$8 031	58 380	$5 000		$71 411	31	$1 021	$495	$6 537	$8 053	58 380	$5 000		$71 433
DPRK**	986	$32 544	$15 779	$14 988	$63 310	54 932	$5 000		$123 242	990	$32 676	$15 843	$14 988	$63 506	54 932	$5 000		$123 438
India	50 149	$3 109 256	$802 389	$416 223	$4 327 868	312 942	$50 000	$5 274 250	$9 965 060	51 045	$3 164 788	$816 720	$416 223	$4 397 731	312 942	$50 000	$5 274 250	$10 034 923
Indonesia	9 888	$326 288	$316 401	$99 903	$742 592	135 062	$20 000	$219 250	$1 116 904	9 983	$329 424	$319 441	$99 903	$748 768	135 062	$20 000	$219 250	$1 123 080
Maldives	13	$710	$421	$6 537	$7 667	11 948	$5 000		$24 615	13	$719	$426	$6 537	$7 681	11 948	$5 000		$24 629
Myanmar	1 965	$117 887	$31 437	$21 731	$171 055	86 750	$5 000	$273 750	$536 555	1 981	$118 834	$31 689	$21 731	$172 254	86 750	$5 000	$273 750	$537 754
Nepal	1 261	$41 627	$20 183	$14 988	$76 797	20 390	$5 000	$513 750	$615 937	1 282	$42 318	$20 518	$14 988	$77 823	20 390	$5 000	$513 750	$616 963
Sri Lanka	856	$28 240	$13 692	$14 988	$56 920	10 106	$5 000		$72 026	862	$28 454	$13 796	$14 988	$57 237	10 106	$5 000		$72 343
Thailand	2 810	$151 725	$89 911	$24 976	$266 613	385 814	$5 000		$657 427	2 823	$152 434	$90 331	$24 976	$267 741	385 814	$5 000		$658 555
Timor-Leste	49	$1 615	$783	$8 329	$10 728	21 294	$5 000		$37 022	50	$1 666	$808	$8 329	$10 803	21 294	$5 000		$37 097
Total	**74 183**	**$4 014 699**	**$1 390 295**	**$680 809**	**$6 085 803**	**$1 142 188**	**$115 000**	**$6 848 500**	**14 191 491**	**75 316**	**$4 078 754**	**$1 410 149**	**$680 809**	**$6 169 713**	**$1 142 188**	**$115 000**	**$6 848 500**	**$14 275 401**

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Annex 10 continued

Country	2015									2016								
	Expected no. of susp cases @ 4/100K*	Investiga-tion cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total	Expected no. of susp cases @ 2/100K*	Investi-gation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	6 333	$208 978	$101 323	$51 610	$361 911	$44 570	$5 000	$1 135 000	$1 546 481	3 204	$105 726	$51 261	$28 305	$185 293	$44 570	$0	$1 135 000	$1 364 863
Bhutan	31	$1 035	$502	$6 537	$8 074	$58 380	$5 000		$71 454	16	$524	$254	$6 537	$7 315	$58 380	$0		$65 695
DPRK**	994	$32 807	$15 907	$14 988	$63 702	$54 932	$5 000		$123 634	499	$16 470	$7 985	$11 659	$36 114	$54 932	$0		$91 046
India	51 958	$3 221 377	$831 323	$416 223	$4 468 923	$312 942	$50 000	$10 548 500	$15 380 365	52 888	$3 279 043	$846 205	$249 758	$4 375 005	$312 942	$0	$10 548 500	$15 236 447
Indonesia	10 075	$332 482	$322 407	$99 903	$754 792	$135 062	$20 000	$438 500	$1 348 354	5 083	$167 729	$162 646	$59 952	$390 327	$135 062	$0	$438 500	$963 889
Maldives	13	$728	$431	$6 537	$7 695	$11 948	$5 000		$24 643	7	$368	$218	$6 537	$7 123	$11 948	$0		$19 071
Myanmar	1 996	$119 764	$31 937	$21 731	$173 432	$86 750	$5 000	$547 500	$812 682	1 006	$60 335	$16 089	$15 039	$91 463	$86 750	$0	$547 500	$725 713
Nepal	1 303	$43 006	$20 852	$14 988	$78 846	$20 390	$5 000	$1 027 500	$1 131 736	662	$21 847	$10 592	$11 659	$44 098	$20 390	$0	$1 027 500	$1 091 988
Sri Lanka	868	$28 656	$13 894	$14 988	$57 538	$10 106	$5 000		$72 644	437	$14 423	$6 993	$11 659	$33 075	$10 106	$0		$43 181
Thailand	2 835	$153 091	$90 721	$24 976	$268 788	$385 814	$5 000		$659 602	1 423	$76 850	$45 541	$18 317	$140 708	$385 814	$0		$526 522
Timor-Leste	52	$1 717	$833	$8 329	$10 879	$21 294	$5 000		$37 173	27	$885	$429	$8 329	$9 643	$21 294	$0		$30 937
Total	**76 459**	**$4 143 642**	**$1 430 128**	**$680 809**	**$6 254 579**	**$1 142 188**	**$115 000**	**$13 697 000**	**$21 208 767**	**65 251**	**$3 744 200**	**$1 148 214**	**$427 749**	**$5 320 163**	**$1 142 188**	**$0**	**$13 697 000**	**$20 159 351**

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Annex 10 continued

Country	2017									2018								
	Expected no. of susp cases @ 2/100K*	Investi-gation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total	Expected no. of susp cases @ 2/100K*	Investi-gation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	3 240	$106 932	$51 846	$28 305	$187 083	$44 570	$5 000	$1 702 500	$1 939 153	3 276	$108 108	$52 416	$28 305	$188 829	$44 570	$0	$2 270 000	$2 503 399
Bhutan	16	$530	$257	$6 537	$7 324	$58 380	$5 000		$70 704	16	$536	$260	$6 537	$7 333	$58 380	$0		$65 713
DPRK**	501	$16 536	$8 018	$11 659	$36 212	$54 932	$5 000		$96 144	503	$16 603	$8 050	$11 659	$36 311	$54 932	$0		$91 243
India	52 888	$3 279 043	$846 205	$249 758	$4 375 005	$312 942	$50 000	$15 822 750	$20 560 697	54 802	$3 397 695	$876 824	$249 758	$4 524 277	$312 942	$0	$21 097 000	$25 934 219
Indonesia	5 127	$169 177	$164 050	$59 952	$393 179	$135 062	$20 000	$657 750	$1 205 991	5 169	$170 586	$165 417	$59 952	$395 955	$135 062	$0	$877 000	$1 408 017
Maldives	7	$372	$221	$6 537	$7 130	$11 948	$5 000		$24 078	7	$377	$223	$6 537	$7 136	$11 948	$0		$19 084
Myanmar	1 013	$60 775	$16 207	$15 039	$92 021	$86 750	$5 000	$821 250	$1 005 021	1 020	$61 204	$16 321	$15 039	$92 563	$86 750	$0	$1 095 000	$1 274 313
Nepal	672	$22 189	$10 759	$11 659	$44 607	$20 390	$5 000	$1 541 250	$1 611 247	683	$22 531	$10 924	$11 659	$45 113	$20 390	$0	$2 055 000	$2 120 503
Sri Lanka	440	$14 513	$7 036	$11 659	$33 208	$10 106	$5 000		$48 314	442	$14 596	$7 077	$11 659	$33 332	$10 106	$0		$43 438
Thailand	1 428	$77 133	$45 708	$18 317	$141 158	$385 814	$5 000		$531 972	1 433	$77 394	$45 863	$18 317	$141 574	$385 814	$0		$527 388
Timor-Leste	28	$912	$442	$8 329	$9 683	$21 294	$5 000		$35 977	28	$939	$455	$8 329	$9 724	$21 294	$0		$31 018
Total	**65 360**	**$3 748 113**	**$1 150 748**	**$427 749**	**$5 326 610**	**$1 142 188**	**$115 000**	**$20 545 500**	**$27 129 298**	**67 380**	**$3 870 568**	**$1 183 831**	**$427 749**	**$5 482 148**	**$1 142 188**	**$0**	**$27 394 000**	**$34 018 336**

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Annex 10 continued

Country	2019									2020								
	Expected no. of susp cases @ 2/100K*	Investi-gation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total	Expected no. of susp cases @ 2/100K*	Investi-gation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	3 311	$109 259	$52 974	$31 634	$193 867	$44 570	$5 000	$2 270 000	$2 513 437	3 345	$110 389	$53 522	$31 634	$195 545	$44 570		$2 270 000	$2 510 115
Bhutan	16	$542	$263	$6 537	$7 341	$58 380	$5 000		$70 721	17	$547	$265	$6 537	$7 349	$58 380			$65 729
DPRK**	505	$16 669	$8 082	$11 659	$36 409	$54 932	$5 000		$96 341	507	$16 735	$8 114	$11 659	$36 507	$54 932			$91 439
India	55 786	$3 458 725	$892 574	$249 758	$4 601 057	$312 942	$50 000	$21 097 000	$26 060 999	56 789	$3 520 922	$908 625	$249 758	$4 679 305	$312 942		$21 097 000	$26 089 247
Indonesia	5 211	$171 959	$166 748	$179 806	$518 513	$135 062	$20 000	$877 000	$1 550 575	5 251	$173 296	$168 044	$59 952	$401 292	$135 062		$877 000	$1 413 354
Maldives	7	$381	$226	$6 537	$7 143	$11 948	$5 000		$24 091	7	$385	$228	$6 537	$7 149	$11 948			$19 097
Myanmar	1 027	$61 620	$16 432	$15 039	$93 091	$86 750	$5 000	$1 095 000	$1 279 841	1 034	$62 025	$16 540	$15 039	$93 604	$86 750		$1 095 000	$1 275 354
Nepal	693	$22 871	$11 089	$11 659	$45 618	$20 390	$5 000	$2 055 000	$2 126 008	703	$23 208	$11 253	$11 659	$46 120	$20 390		$2 055 000	$2 121 510
Sri Lanka	445	$14 674	$7 115	$11 659	$33 448	$10 106	$5 000		$48 554	447	$14 747	$7 150	$11 659	$33 555	$10 106			$43 661
Thailand	1 438	$77 636	$46 006	$18 317	$141 959	$385 814	$5 000		$532 773	1 442	$77 858	$46 138	$18 317	$142 314	$385 814			$528 128
Timor-Leste	29	$967	$469	$8 329	$9 766	$21 294	$5 000		$36 060	30	$996	$483	$8 329	$9 809	$21 294			$31 103
Total	**68 468**	**$3 935 302**	**$1 201 977**	**$550 933**	**$5 688 212**	**$1 142 188**	**$115 000**	**$27 394 000**	**$34 339 400**	**69 572**	**$4 001 108**	**$1 220 362**	**$431 078**	**$5 652 548**	**$1 142 188**	**$0**	**$27 394 000**	**$34 188 736**

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Annex 10 continued

Country	Total 2013–15									Total 2016–20								
	Expected no. of susp cases	Investigation cost	Shipping cost @ 80%	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total	Expected no. of susp cases	Investigation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	18 764	$619 200	$300 218	$154 831	$1 074 248	$133 710	$15 000	$2 270 000	$3 492 958	16 376	$540 414	$262 019	$148 184	$950 618	$222 850	$10 000	$9 647 500	$10 830 968
Bhutan	93	$3 063	$1 485	$19 610	$24 157	$175 140	$15 000		$214 297	81	$2 679	$1 299	$32 683	$36 661	$291 900	$10 000		$338 561
DPRK**	2 971	$98 027	$47 528	$44 964	$190 519	$164 796	$15 000		$370 315	2 516	$83 012	$40 248	$58 293	$181 553	$274 660	$10 000		$466 213
India	153 152	$9 495 421	$2 450 431	$1 248 669	$13 194 521	$938 826	$150 000	$21 097 000	$35 380 347	273 152	$16 935 427	$4 370 433	$1 248 790	$22 554 650	$1 564 710	$100 000	$89 662 250	$113 881 610
Indonesia	29 945	$988 194	$958 249	$299 710	$2 246 153	$405 186	$60 000	$877 000	$3 588 339	25 841	$852 747	$826 906	$419 613	$2 099 265	$675 310	$40 000	$3 727 250	$6 541 825
Maldives	40	$2 156	$1 278	$19 610	$23 044	$35 844	$15 000		$73 888	35	$1 882	$1 116	$32 683	$35 681	$59 740	$10 000		$105 421
Myanmar	5 941	$356 485	$95 063	$65 193	$516 741	$260 250	$15 000	$1 095 000	$1 886 991	5 099	$305 959	$81 589	$75 193	$462 742	$433 750	$10 000	$4 653 750	$5 560 242
Nepal	3 847	$126 951	$61 552	$44 964	$233 466	$61 170	$15 000	$2 055 000	$2 364 636	3 414	$112 646	$54 616	$58 293	$225 555	$101 950	$10 000	$8 733 750	$9 071 255
Sri Lanka	2 586	$85 350	$41 382	$44 964	$171 695	$30 318	$15 000		$217 013	2 211	$72 953	$35 371	$58 293	$166 617	$50 530	$10 000		$227 147
Thailand	8 468	$457 251	$270 963	$74 927	$803 141	$1 157 442	$15 000		$1 975 583	7 164	$386 871	$229 257	$91 586	$707 714	$1 929 070	$10 000		$2 646 784
Timor-Leste	151	$4 998	$2 423	$24 988	$32 409	$63 882	$15 000		$111 291	142	$4 700	$2 279	$41 647	$48 625	$106 470	$10 000		$165 095
Total	**225 958**	**$12 237 095**	**$4 230 572**	**$2 042 428**	**$18 510 095**	**$3 426 564**	**$345 000**	**$27 394 000**	**$49 675 659**	**336 031**	**$19 299 291**	**$5 905 133**	**$2 265 257**	**$27 469 681**	**$5 710 940**	**$230 000**	**$116 424 500**	**$149 835 121**

**Democratic People's Republic of Korea

Annex 10 continued

Country	Grand toal 2013–2020								
	Expected no. of susp cases	Investigation cost	Shipping cost @ 80% of cases	Lab cost	Total Ops	Surv Training cost	Lab Training cost	WHO staff & SSA costs (personnel & ops)	Total
Bangladesh	35 140	$1 159 614	$562 237	$303 015	$2 024 866	$356 560	$25 000	$11 917 500	**$14 323 926**
Bhutan	174	$5 742	$2 784	$52 293	$60 818	$467 040	$25 000		**$552 858**
DPRK**	5 486	$181 039	$87 776	$103 257	$372 072	$439 456	$25 000		**$836 528**
India	426 304	$26 430 848	$6 820 864	$2 497 459	$35 749 171	$2 503 536	$250 000	$110 759 250	**$149 261 957**
Indonesia	55 786	$1 840 941	$1 785 155	$719 322	$4 345 418	$1 080 496	$100 000	$4 604 250	**$10 130 164**
Maldives	75	$4 038	$2 393	$52 293	$58 724	$95 584	$25 000		**$179 308**
Myanmar	11 041	$662 445	$176 652	$140 386	$979 482	$694 000	$25 000	$5 748 750	**$7 447 232**
Nepal	7 261	$239 597	$116 168	$103 257	$459 022	$163 120	$25 000	$10 788 750	**$11 435 892**
Sri Lanka	4 797	$158 303	$76 753	$103 257	$338 312	$80 848	$25 000		**$444 160**
Thailand	15 632	$844 122	$500 220	$166 513	$1 510 855	$3 086 512	$25 000		**$4 622 367**
Timor-Leste	294	$9 698	$4 702	$66 634	$81 034	$170 352	$25 000		**$276 386**
Total	31 536 385	$31 536 385	$10 135 704	$4 307 686	$45 979 776	$9 137 504	$575 000	$143 818 500	**$199 510 780**

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Annex 11 Summary of estimated SIA,* ORI,* and meales and rubella surveillance costs, by country and year, SEAR 2013–2020

Country	2013				2014				2015			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh	62 610 793		971 292	63 582 085			975 185	975 185			1 546 481	1 546 481
Bhutan			71 411	71 411			71 433	71 433			71 454	71 454
DPRK**			123 242	123 242			123 438	123 438			123 634	123 634
India			9 965 060	9 965 060			10 034 923	10 034 923	176 549 779		15 380 365	191 930 143
Indonesia			1 116 904	1 116 904	90 175 810		1 123 080	91 298 890			1 348 354	1 348 354
Maldives			24 615	24 615			24 629	24 629			24 643	24 643
Myanmar			536 555	536 555			537 754	537 754	15 664 547		812 682	16 477 229
Nepal			615 937	615 937			616 963	616 963	3 912 860		1 131 736	5 044 596
Sri Lanka			72 026	72 026			72 343	72 343			72 644	72 644
Thailand			657 427	657 427	31 287 679		658 555	31 946 233			659 602	659 602
Timor-Leste	98 166		37 022	135 187			37 097	37 097	791 571		37 173	828 744
Total	**62 708 959**	**0**	**14 191 491**	**76 900 450**	**121 463 489**	**0**	**14 275 401**	**135 738 890**	**196 918 757**	**0**	**21 208 767**	**218 127 524**

* Assumes India uses MR for SIAs and ORI

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Annex 11 continued

Country	2016				2017				2018			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh	20 820 121	0	1 364 863	22 184 984		1 070 823	1 939 153	3 009 976		1 093 194	2 503 399	3 596 593
Bhutan		5 144	65 695	70 839		5 293	70 704	75 997		5 407	65 713	71 120
DPRK**		123 938	91 046	214 984		128 938	96 144	225 082		134 027	91 243	225 270
India	20 588 142	0	15 236 447	35 824 590	305 091	0	20 560 697	20 865 789	36 532 602	0	25 934 219	62 466 821
Indonesia		1 492 244	963 889	2 456 133		1 527 822	1 205 991	2 733 813	31 166 764	1 558 338	1 408 017	34 133 120
Maldives		1 935	19 071	21 006		1 988	24 078	26 066		2 026	19 084	21 111
Myanmar		278 048	725 713	1 003 760		285 379	1 005 021	1 290 399		292 882	1 274 313	1 567 195
Nepal		256 060	1 091 988	1 348 047		265 356	1 611 247	1 876 603		273 081	2 120 503	2 393 584
Sri Lanka		125 268	43 181	168 449		127 021	48 314	175 334		129 443	43 438	172 881
Thailand		287 436	526 522	813 958		292 595	531 972	824 567		297 345	527 388	824 733
Timor-Leste		15 689	30 937	46 626		16 684	35 977	52 661	357 411	17 871	31 018	406 300
Total	**41 408 263**	**2 585 761**	**20 159 351**	**64 153 376**	**305 091**	**3 721 898**	**27 129 298**	**31 156 288**	**68 056 778**	**3 803 613**	**34 018 336**	**105 878 727**

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Annex 11 continued

Country	2019				2020			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh		978 965	2 513 437	3 492 402	19 383 297	998 824	2 510 115	22 892 236
Bhutan		4 843	70 721	75 563		4 934	65 729	70 662
DPRK**		122 365	96 341	218 706		126 955	91 439	218 394
India	46 127 276	2 651 742	26 060 999	74 840 017	10 796 847	6 353 339	26 089 247	43 239 432
Indonesia		1 395 794	1 550 575	2 946 369		1 423 052	1 413 354	2 836 406
Maldives		1 808	24 091	25 899		1 831	19 097	20 928
Myanmar		263 985	1 279 841	1 543 826		270 197	1 275 354	1 545 551
Nepal	5 609 570	246 591	2 126 008	7 982 170		253 719	2 121 510	2 375 229
Sri Lanka		115 988	48 554	164 541		117 789	43 661	161 451
Thailand		265 641	532 773	798 414		270 223	528 128	798 350
Timor-Leste		16 807	36 060	52 866		17 867	31 103	48 970
Total	**51 736 846**	**6 064 527**	**34 339 400**	**92 140 773**	**30 180 143**	**9 838 730**	**34 188 736**	**74 207 610**

** Democratic People's Republic of Korea

Annex 11 continued

Country	2013-15				2016-20				2013-2020			
	SIA	ORI	Surv	Total	SIA	ORI	ORI	Total	SIA	ORI	Surv	Total
Bangladesh	62 610 793		3 492 958	66 103 752	40 203 418	4 141 806	10 830 968	55 176 191	102 814 211	4 141 806	14 323 926	121 279 943
Bhutan			214 297	214 297		25 620	338 561	364 181		25 620	552 858	578 479
DPRK**			370 315	370 315		636 223	466 213	1 102 436		636 223	836 528	1 472 751
India	176 549 779		35 380 347	211 930 126	114 349 959	9 005 080	113 881 610	237 236 649	290 899 737	9 005 080	149 261 957	449 166 774
Indonesia	90 175 810		3 588 339	93 764 149	31 166 764	7 397 251	6 541 825	45 105 840	121 342 575	7 397 251	10 130 164	138 869 990
Maldives			73 888	73 888		9 588	105 421	115 009		9 588	179 308	188 897
Myanmar	15 664 547		1 886 991	17 551 538		1 390 490	5 560 242	6 950 732	15 664 547	1 390 490	7 447 232	24 502 269
Nepal	3 912 860		2 364 636	6 277 496	5 609 570	1 294 807	9 071 255	15 975 633	9 522 430	1 294 807	11 435 892	22 253 129
Sri Lanka			217 013	217 013		615 509	227 147	842 656		615 509	444 160	1 059 669
Thailand	31 287 679		1 975 583	33 263 262		1 413 239	2 646 784	4 060 022	31 287 679	1 413 239	4 622 367	37 323 285
Timor-Leste	889 737		111 291	1 001 028	357 411	84 917	165 095	607 423	1 247 148	84 917	276 386	1 608 451
Total	**381 091 204**		**49 675 659**	**430 766 863**	**191 687 122**	**26 014 530**	**149 835 121**	**367 536 773**	**572 778 327**	**26 014 530**	**199 510 780**	**798 303 636**

** Democratic People's Republic of Korea

Annex 12 Summary of estimated costs to eliminate measles and prevent rubella and CRS, SEAR 2013–2020

Country	2013				2014				2015			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh	62 610 793		971 292	63 582 085			975 185	975 185			1 546 481	1 546 481
Bhutan			71 411	71 411			71 433	71 433			71 454	71 454
DPRK**			123 242	123 242			123 438	123 438			123 634	123 634
India			9 965 060	9 965 060			10 034 923	10 034 923	176 549 779		15 380 365	191 930 143
Indonesia			1 116 904	1 116 904	90 175 810		1 123 080	91 298 890			1 348 354	1 348 354
Maldives			24 615	24 615			24 629	24 629			24 643	24 643
Myanmar			536 555	536 555			537 754	537 754	15 664 547		812 682	16 477 229
Nepal			615 937	615 937			616 963	616 963	3 912 860		1 131 736	5 044 596
Sri Lanka			72 026	72 026			72 343	72 343			72 644	72 644
Thailand			657 427	657 427	31 287 679		658 555	31 946 233			659 602	659 602
Timor-Leste	98 166		37 022	135 187			37 097	37 097	791 571		37 173	828 744
Total	**62 708 959**	**0**	**14 191 491**	**76 900 450**	**121 463 489**	**0**	**14 275 401**	**135 738 890**	**196 918 757**	**0**	**21 208 767**	**218 127 524**

* India uses MR for SIAs and ORI

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Annex 12 continued

Country	2016				2017				2018			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh	20 820 121	0	1 364 863	22 184 984		1 070 823	1 939 153	3 009 976		1 093 194	2 503 399	3 596 593
Bhutan		5 144	65 695	70 839		5 293	70 704	75 997		5 407	65 713	71 120
DPRK**		123 938	91 046	214 984		128 938	96 144	225 082		134 027	91 243	225 270
India	20 588 142	0	15 236 447	35 824 590	305 091	0	20 560 697	20 865 789	36 532 602	0	25 934 219	62 466 821
Indonesia		1 492 244	963 889	2 456 133		1 527 822	1 205 991	2 733 813	31 166 764	1 558 338	1 408 017	34 133 120
Maldives		1 935	19 071	21 006		1 988	24 078	26 066		2 026	19 084	21 111
Myanmar		278 048	725 713	1 003 760		285 379	1 005 021	1 290 399		292 882	1 274 313	1 567 195
Nepal		256 060	1 091 988	1 348 047		265 356	1 611 247	1 876 603		273 081	2 120 503	2 393 584
Sri Lanka		125 268	43 181	168 449		127 021	48 314	175 334		129 443	43 438	172 881
Thailand		287 436	526 522	813 958		292 595	531 972	824 567		297 345	527 388	824 733
Timor-Leste		15 689	30 937	46 626		16 684	35 977	52 661	357 411	17 871	31 018	406 300
Total	**41 408 263**	**2 585 761**	**20 159 351**	**64 153 376**	**305 091**	**3 721 898**	**27 129 298**	**31 156 288**	**68 056 778**	**3 803 613**	**34 018 336**	**105 878 727**

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Annex 12 continued

Country	2019				2020			
	SIA	ORI	Surv	Total	SIA	ORI	Surv	Total
Bangladesh		978 965	2 513 437	3 492 402	19 383 297	998 824	2 510 115	22 892 236
Bhutan		4 843	70 721	75 563		4 934	65 729	70 662
DPRK**		122 365	96 341	218 706		126 955	91 439	218 394
India	46 127 276	2 651 742	26 060 999	74 840 017	10 796 847	6 353 339	26 089 247	43 239 432
Indonesia		1 395 794	1 550 575	2 946 369		1 423 052	1 413 354	2 836 406
Maldives		1 808	24 091	25 899		1 831	19 097	20 928
Myanmar		263 985	1 279 841	1 543 826		270 197	1 275 354	1 545 551
Nepal	5 609 570	246 591	2 126 008	7 982 170		253 719	2 121 510	2 375 229
Sri Lanka		115 988	48 554	164 541		117 789	43 661	161 451
Thailand		265 641	532 773	798 414		270 223	528 128	798 350
Timor-Leste		16 807	36 060	52 866		17 867	31 103	48 970
Total	**51 736 846**	**6 064 527**	**34 339 400**	**92 140 773**	**30 180 143**	**9 838 730**	**34 188 736**	**74 207 610**

** Democratic People's Republic of Korea

Annex 12 continued

Country	2013–15				2016–20				2013–2020			
	SIA	ORI	Surv	Total	SIA	ORI	ORI	Total	SIA	ORI	Surv	Total
Bangladesh	62 610 793		3 492 958	66 103 752	40 203 418	4 141 806	10 830 968	55 176 191	102 814 211	4 141 806	14 323 926	121 279 943
Bhutan			214 297	214 297		25 620	338 561	364 181		25 620	552 858	578 479
DPRK**			370 315	370 315		636 223	466 213	1 102 436		636 223	836 528	1 472 751
India	176 549 779		35 380 347	211 930 126	114 349 959	9 005 080	113 881 610	237 236 649	290 899 737	9 005 080	149 261 957	449 166 774
Indonesia	90 175 810		3 588 339	93 764 149	31 166 764	7 397 251	6 541 825	45 105 840	121 342 575	7 397 251	10 130 164	138 869 990
Maldives			73 888	73 888		9 588	105 421	115 009		9 588	179 308	188 897
Myanmar	15 664 547		1 886 991	17 551 538		1 390 490	5 560 242	6 950 732	15 664 547	1 390 490	7 447 232	24 502 269
Nepal	3 912 860		2 364 636	6 277 496	5 609 570	1 294 807	9 071 255	15 975 633	9 522 430	1 294 807	11 435 892	22 253 129
Sri Lanka			217 013	217 013		615 509	227 147	842 656		615 509	444 160	1 059 669
Thailand	31 287 679		1 975 583	33 263 262		1 413 239	2 646 784	4 060 022	31 287 679	1 413 239	4 622 367	37 323 285
Timor-Leste	889 737		111 291	1 001 028	357 411	84 917	165 095	607 423	1 247 148	84 917	276 386	1 608 451
Total	**381 091 204**		**49 675 659**	**430 766 863**	**191 687 122**	**26 014 530**	**149 835 121**	**367 536 773**	**572 778 327**	**26 014 530**	**199 510 780**	**798 303 636**

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Annex 13 Guidelines for Congenital Rubella Surveillance in the South-East Asia Region

1 Rationale

CRS surveillance allows for detection of infants with clinically apparent manifestations and can be standardized for regional and global reporting, and for comparison. Rapid identification of infants with CRS is necessary to ensure that appropriate testing can be conducted and that the infant is entered into the CRS surveillance system. Detection of infants with CRS is necessary to ensure infection control and prevent further spread of rubella, as infants with CRS may shed the virus for a prolonged period – up to one year of age or longer. Immediate diagnosis of CRS also facilitates early intervention for specific defects.

All Member States should develop a CRS surveillance system that captures the majority of infants with suspected CRS within the country. If there is no surveillance in place, countries may opt to establish CRS surveillance in a few sentinel sites first followed by broadening the surveillance and adding additional sites to include more of the population.

2 Overview of CRS surveillance

Routine surveillance for CRS should focus on identifying infants less than one year of age, although some defects associated with CRS surveillance may not be detectable until older ages. The most common congenital defects related to CRS are cataracts, heart defects and hearing impairment. These are the primary conditions under CRS surveillance. These conditions are most likely to be seen at secondary and tertiary health-care facilities, which should be included as sentinel sites for CRS surveillance.

National health authorities should define the objectives and overall structure of the CRS surveillance system, which should be aligned with the existing communicable-disease surveillance system, health- care structure and capacities. Member States should report CRS cases to WHO according to national surveillance system capacities, at least annually.

3 CRS: Case definitions and laboratory criteria for confirmation

Case definitions for CRS

Classification of cases for CRS surveillance is based on clinical, epidemiological and laboratory data. The case definitions for CRS surveillance include the following categories:

Suspected CRS case: Any infant less than one year of age that a health worker suspects of having CRS. A health worker should suspect CRS when an infant aged 0-11 months has heart disease and/or suspicion of hearing impairment and/or one or more of the following eye signs: white pupil (cataract), larger eye ball (congenital glaucoma) or pigmentary retinopathy. A health

worker should also suspect CRS when an infant's mother has a history of suspected or confirmed rubella during pregnancy, even when the infant shows no signs of CRS.

Clinically confirmed CRS case: An infant in whom a qualified physician detects at least two of the complications listed in (a) below or one in (a) and one in (b):

(a) cataract(s), congenital glaucoma, congenital heart disease, hearing impairment, pigmentary retinopathy;

(b) purpura, splenomegaly, microcephaly, developmental delay, meningocephalitis, radiolucent bone disease, jaundice that begins within 24 hours after birth.

Laboratory confirmed CRS case: An infant who is a suspected case (who has one condition from group A) who meets the laboratory criteria for CRS case confirmation.

Congenital rubella infection (CRI): An infant who does not have clinical signs of CRS but has a positive rubella-specific IgM test is classified as having CRI.

Criteria for laboratory confirmation of CRS

Laboratory criteria for confirmation of suspected CRS cases include the following:

- rubella IgM antibody detected; ***or***
- sustained rubella IgG antibody level as determined on at least two occasions between 6 and 12 months of age in the absence of receipt of rubella vaccine; ***or***
- rubella virus detection (e.g. nucleic acid detection by reverse transcription polymerase chain reaction (RT-PCR) or rubella virus isolation) in an appropriate clinical sample (best results come from throat swabs, but nasal swabs, blood, urine, or cerebrospinal fluid specimens are also acceptable).

Efforts should be made to obtain clinical specimens for antibody levels and for viral isolation from infants at the time of the initial investigation. The clinical and laboratory data will be used to determine the final classification of each of the suspected CRS cases. Depending on the age of the suspected CRS case at initial testing, the following consideration should be made interpreting laboratory results and determining final classification of suspected CRS cases (Annex 1):

- Infants with congenital rubella, even without clinical features of CRS will usually be positive for rubella-specific IgM at or shortly after birth. Although IgM antibodies may persist for up to one year, they normally peak within the first six months of life. Because IgM may not be detectable in some infants tested shortly after birth, IgM negative cases with suspected CRS should be retested at one month of age or shortly thereafter.
- Laboratory confirmation of CRS in an infant aged over six months should not rely on the IgM test alone if the result is negative. In such cases, serial IgG testing should also be included to check for a sustained level of antibody over several months.
- Infants with congenital rubella should also be tested for shedding rubella virus through virus isolation techniques. Congenitally infected infants may shed and transmit rubella virus for up to one year of age and be the source of rubella outbreaks. Therefore, it is important to continue testing the infant for virus throughout the first year of life so

that infection control measures can continue until virus shedding stops. This has to be confirmed by two negative results of viral testing of specimens obtained one month apart from infants at least three months of age.

4 Steps to establish a CRS surveillance system

The following steps should be implemented to establish CRS surveillance.

1. Identify national CRS surveillance coordinators responsible for epidemiologic and laboratory components of the system.

   Epidemiologic coordinator oversees:

   - development of a protocol for CRS surveillance;
   - development of necessary training materials;
   - training on the CRS surveillance system;
   - monitoring of surveillance performance and data quality;
   - adequacy of collection and transportation of specimens for laboratory testing;
   - maintenance of the CRS surveillance database;
   - coordination with laboratory activities, to ensure linkage of laboratory and epidemiologic data;
   - coordination of activities with national measles and rubella elimination programme in country, including reporting to WHO;
   - feedback on the CRS surveillance to participating health-care providers and facilities and relevant public health authorities.

   Laboratory coordinator oversees:

   - adequacy of the laboratory testing, standard operating procedures (SOPs), necessary accreditations and an ongoing quality assurance programme;
   - interpretation and reporting of test results for CRS;
   - monitoring duration of virus shedding by CRS cases;
   - coordination with epidemiological activities, to ensure linkage of laboratory and epidemiologic data;
   - laboratory related training.

2. Determine facilities at which infants with CRS are most likely to be seen.

   2.1 Consideration for determining facilities

   - The facilities at which infants with most common defects associated with CRS – cataracts, heart defects, or deafness, as well as infants with maternal history of rubella during pregnancy, are likely to be seen and should be included in the CRS surveillance system. As these defects are most likely to be evaluated and treated

at secondary and tertiary care facilities, *adequate* sentinel surveillance for CRS can be conducted at these facilities without including primary health-care providers and facilities in the CRS surveillance system. This will help to avoid overwhelming general health-care providers by having to identify, report and follow up on cases of CRS.

- The types of facilities/providers most likely to evaluate and treat infants with CRS:
  - secondary care providers/facilities, particularly ophthalmologists, cardiologists, audiologists, neonatologists;
  - tertiary care facilities, particularly those that provide surgical services for the eyes, ears, and heart;
  - specialty care centres (e.g. Children's Hospitals; Centres for Hearing and Blindness);
  - obstetric centres or private clinics involved in care of pregnant women with rubella.

- If providers and facilities included in the CRS surveillance system capture the majority of infants with suspected CRS within a country, the CRS surveillance system can be considered adequate.
- It is recommended that countries with newly established CRS surveillance systems pilot test their system with a few facilities to ensure adequacy of developed protocols and standard operating procedures(SOPs). Protocols may then be updated with feedback from the piloted sites.

2.2 Responsibilities of local surveillance coordinators at sentinel sites include certain steps.

- Ensure adherence to the national protocol and SOPs for CRS surveillance.
- Assist as needed in training health-care providers and staff at the respective facilities.
- Ensure collection of clinical and epidemiologic data and completion of case investigation forms (Annex 2).
- Ensure appropriate collection and transportation of specimens with and ensuring that laboratory data can be linked to clinical and epidemiologic information.
- Maintain a line listing of suspected CRS cases in the assigned facilities.
- Provide periodic feedback to health-care providers at their respective sites.
- Maintain contact with the national coordinator regarding identification and follow-up of suspected cases of CRS identified in the area.

3. Conduct initial and refresher trainings for participating providers.

- Trainings for the providers from the sentinel facilities participating in CRS surveillance activities should be conducted on an annual basis.
- Trainings should include information regarding clinical features of CRS, evaluation of infants with suspected CRS, appropriate laboratory testing of suspected cases, follow-up of CRS cases, the importance of completing case investigation forms, infection control

measures to prevent rubella virus spread from infants with CRS and reporting cases in a timely manner.

4. Initiate CRS surveillance activities.
    - Reporting of suspected CRS cases should be initiated once the coordinator and participating sites have been identified and participating providers have been trained in SOPs for CRS surveillance.

5. Conduct surveillance quality assessment and monitoring.
    - Surveillance quality assessments need to be conducted at the sentinel sites at least every six months to assess completeness of CRS surveillance at the site.
        - This should be done by reviewing hospital records by the site level coordinator to identify any missed cases.
        - Missed cases can be identified by comparing the list of reported CRS cases with the list of all cases that meet the entry criteria for CRS surveillance (i.e. criteria for suspected CRS case). The proportion of missed cases at a sentinel site can be assessed as the percent of missed cases identified by the coordinator among all cases that meet the CRS surveillance entry criteria (total of both reported and unreported cases).
        - Similarly, the proportion of suspected CRS cases that have been reported, but have not been tested by laboratory, can be assessed as the percentage of reported cases without laboratory testing among all reported suspected CRS cases (both tested and untested).
    - Monitoring surveillance data quality. CRS surveillance case reports should be assessed for any missing variables. If records are incomplete, the findings should be discussed with providers at the site and the need for completeness of data and case reporting should be emphasized.

6. Expand CRS surveillance and include other sites, as appropriate. In countries that have conducted limited pilot testing of CRS surveillance systems, or in countries where assessments have shown that the majority of infants within the country are not included in CRS surveillance, the surveillance should be expanded to include more sites with the ultimate goal of establishing sentinel site surveillance that captures the majority of infants in the country.

7. Analyse the CRS surveillance data on an annual basis, or more frequently if necessary. Epidemiologic variables that should be assessed include:
    - number of cases reported throughout time frame assessed (e.g. year);
    - case classification status;
    - geographic location of CRS cases within the country;
    - whether or not cases were clustered and/or associated with rubella outbreaks;
    - maternal characteristics (age, race/ethnicity, country of birth);
    - location of maternal exposure to rubella.

8. Provide feedback to stakeholders involved in the CRS surveillance system.
    - Feedback should include information on the status of the epidemiology of CRS including, if necessary any updates and recommendations for improvements.

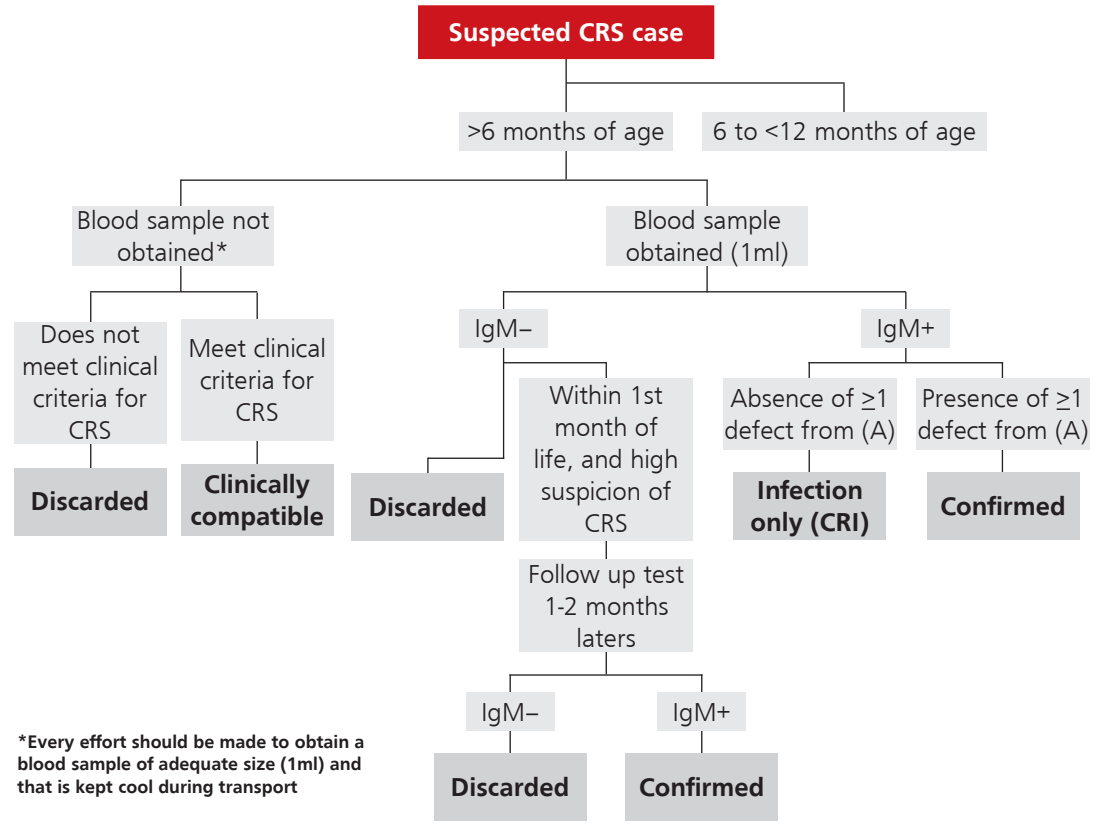
9. Ensure infection control measure for CRS cases.
    - Infants with CRS may shed rubella virus for up to one year and have been the cause of rubella outbreaks. Only persons immune to rubella should have contact with these infants. In the hospital, and infants should remain in isolation. Persons caring for the patient should wear a gown and gloves and should be immunized against rubella. Family members and friends involved in the care or handling of the infant should be immune to rubella.

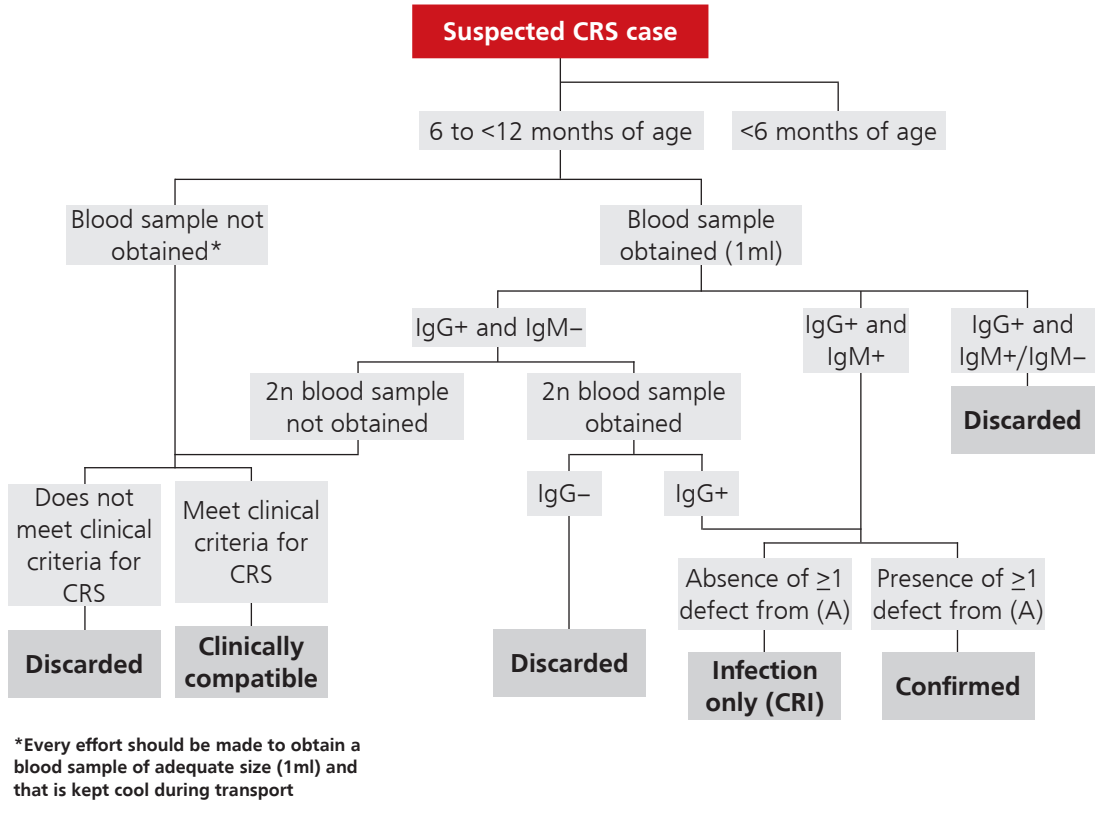
5 Additional approach to identify CRS cases

Rubella in pregnancy registries

Rubella in the pregnancy registry can be used for follow-up of pregnant women exposed to rubella and their pregnancy outcome(s), as well as for identification of CRS cases. Rubella in pregnancy registries should be maintained at the local level so that comprehensive follow-up of pregnant women can occur and infants born with CRS can be identified and diagnosed immediately and receive early interventions for any associated defects. The registry should include maternal contact, demographic data and pregnancy outcome (e.g. miscarriage, termination, infant with CRS, etc.).

Annex 13A Flow chart of classification of CRS cases depending on age group





Annex 13B Congenital rubella syndrome case investigation form

Recommended basic set of data for case-based reporting in national surveillance system

Please fill in this form for investigation and reporting of a clinically suspected case of CRS

Case ID: Region: District:

Date of notification: / / Date of investigation: / / Date of reporting: / /

A. Identification

Name of the child: _____ Sex: Male ☐ Female ☐

Date of birth: ___ /___ /___ if not available – age in months_____

Address:_____

Place infant delivered: _____

Name of mother:_____

B. Clinical signs and symptoms

Gestational age (weeks) at birth:_____ Birth weight (grams): _____

Group A (please complete all)		**Group B** (please complete all)	
Congenital heart disease:	Yes ☐ No ☐ Unknown ☐	Purpura:	Yes ☐ No ☐ Unknown ☐
If yes, please specify defect:_____		Microcephaly:	Yes ☐ No ☐ Unknown ☐
Cataracts:	Yes ☐ No ☐ Unknown ☐	Meningoencephalitis	Yes ☐ No ☐ Unknown ☐
Congenital glaucoma:	Yes ☐ No ☐ Unknown ☐	Jaundice:	Yes ☐ No ☐ Unknown ☐
Pigmentary retinopathy:	Yes ☐ No ☐ Unknown ☐	Splenomegaly:	Yes ☐ No ☐ Unknown ☐
Hearing impairment:	Yes ☐ No ☐ Unknown ☐	Developmental delay:	Yes ☐ No ☐ Unknown ☐
		Radiolucent bone disease:	Yes ☐ No ☐ Unknown ☐
		Radiolucent bone disease:	Yes ☐ No ☐ Unknown ☐

Other abnormalities: Yes ☐ No ☐ If yes, please describe:_____

Name of physician who examined infant:_____

City/town/village:_____

Telephone:_____

Present status of infant: Alive _ Dead _

If dead, cause of death: _____

Autopsy conducted: Yes ☐ No ☐ Unknown _

Autopsy findings:_____

Autopsy date:_____/____/_____

C. Maternal history/Antenatal care

Number of previous pregnancies: Mother's age (years):

Vaccinated against rubella: Yes ☐ No ☐ Unknown ☐ If yes, give date: ___/___/___

Rubella like illness during pregnancy: Yes ☐ No ☐ Unknown ☐ If yes, month of pregnancy:_____

Maculopapular rash: Yes ☐ No ☐ Unknown ☐ If yes, date of onset___/___/___

Lymph nodes swollen: Yes ☐ No ☐ Unknown ☐ If yes, date of onset___/___/___

Arthralgia/arthritis: Yes ☐ No ☐ Unknown ☐ If yes, date of onset___/___/___

Other complications Yes ☐ No ☐ Unknown ☐ If yes, date of onset___/___/___

Was rubella laboratory-confirmed in the mother Yes _ No _ Unknown _

If yes, when (date): ___/___/___

Was the mother exposed during pregnancy to person(s) of any age with maculopapular (e.g. not vesicular) rash

illness with fever Yes ☐ No ☐ Unknown ☐ If yes, when (date): ___/___/___

Month of pregnancy:_____

Describe where:_____

Did the mother travel during pregnancy: Yes ☐ No ☐ Unknown ☐ If yes, when (date): ___/___/___

Month of pregnancy:_____ Describe where:_____

D. Infant/child laboratory investigations

Specimen collected: Yes ☐ No ☐ Unknown☐_

If yes, please type of specimen: Serum ☐ Throat swab ☐ Urine ☐ Cerebrospinal fluid ☐ Other ☐

Date of specimen collection: ___/___/___ Date specimen sent: ___/___/___

Rubella IgM: Not tested ☐ Positive ☐ Negative ☐ In process ☐ Inconclusive ☐

Sustained IgG level*: IgG not tested ☐ Yes ☐ No ☐ In process ☐

*(*sustained IgG level on at least 2 occasions between 6 and 12 months of age)*

Rubella virus isolation: Not tested ☐ Positive ☐ Negative ☐ In process ☐

Rubella PCR: Not done ☐ Positive ☐ Negative ☐ In process ☐ Genotype_____

Date of laboratory result (first validated result): _____/_____/_____

E. Final classification

CRS ☐ Discarded ☐ If discarded, please specify:_____

Case classification as Laboratory-confirmed ☐ Epidemiologically linked ☐ Clinical ☐

Classification by origin: Endemic ☐ Imported ☐ Import-related ☐ Unknown ☐

Date of final classification: _____/_____/_____

Investigator:_____

The Sixty-sixth WHO Regional Committee for South-East Asia in September 2013 resolved to adopt the goal of measles elimination and rubella/CRS control in the South-East Asia Region by 2020. In response, the WHO Regional Office for South-East Asia developed this Strategic Plan for Measles Elimination and Rubella and Congenital Rubella Syndrome Control in the South-East Asia Region. This strategic document provides technical support to Member States in their efforts to develop elimination policy and strategies, while strengthening their immunization and surveillance systems and improving their programme performance. In this way, these ambitious 2020 goals can be met.

World Health Organization
Regional Office for South-East Asia
World Health House
Indraprastha Estate,
Mahatma Gandhi Marg,
New Delhi-110002, India
www.searo.who.int

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